

Docket No.: 29827/40663  
(PATENT)

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Patent Application of:  
Andreas A. Popp et al.

Application No.: 10/516,702

Confirmation No.: 6743

Filed: December 2, 2004

Art Unit: 1796

For: (Meth)Acrylic Esters of Polyalkoxylated Glycerine

Examiner: Wililam K. Cheung

**APPEAL BRIEF**

MS Appeal Brief - Patents  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

This Appeal Brief is submitted in triplicate to support the Notice of Appeal, filed in this application on March 12, 2008. This Appeal Brief is accompanied by the fee for filing an Appeal Brief under 37 C.F.R. §1.17(b) and a one-month extension of time under 37 C.F.R. §1.136(a). Accordingly, this Appeal Brief is timely filed and no further fees and believed due.

Any additional required fee may be charged, or any overpayment credited, to Deposit Account No. 13-2855.

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**III. REAL PARTY IN INTEREST**

The real party in interest in this appeal is BASF Aktiengesellschaft (BASF), Ludwigshafen, Germany, the assignee of the entire right, title, and interest to the above-identified patent application. The assignment was recorded in the United States Patent and Trademark Office ("USPTO") at Reel 16550, Frame 0462 on May 11, 2005, which constitutes the entire chain of title from the inventors to BASF.

**IV. RELATED APPEALS AND INTERFERENCES**

There are no related appeals or interferences known to appellants, appellants' legal representative, or the assignee which will directly affect or be directly affected by, or have a bearing on, the Board's decision in the pending appeal.

**V. STATUS OF CLAIMS**

**A. HISTORY**

This application was originally filed with claims 1-28. Claims 29-34 were added to the application in a preliminary amendment.

**B. CURRENT STATUS OF CLAIMS**

Claims cancelled: 2, 3, 8, 9, 17, 19, 20, 24, 25, 28, and 31.

Claims withdrawn from consideration but not cancelled: None.

Claims pending: 1, 4-7, 10-16, 18, 21-23, 26, 27, 29, 30, and 32-34.

Claims allowed: None.

Claims rejected: 1, 4-7, 10-16, 18, 21-23, 26, 27, 29, 30, and 32-34.

**C. CLAIMS ON APPEAL**

The claims on appeal are claims 1, 4-7, 10-16, 18, 21-23, 26, 27, 29, 30, and 32-34.

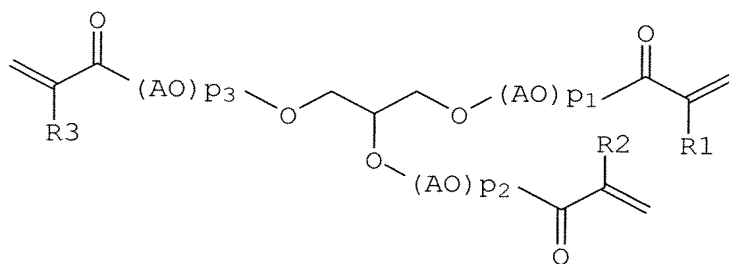
**VI. STATUS OF AMENDMENTS**

Appellants filed an after-final amendment on January 25, 2008. The amendment was not entered, as indicated in the Advisory Action mailed February 2, 2008. Accordingly, appellants understand that the current form of the claims are represented by Amendment "A", filed August 1, 2007, and as reproduced in the Claims Appendix below.

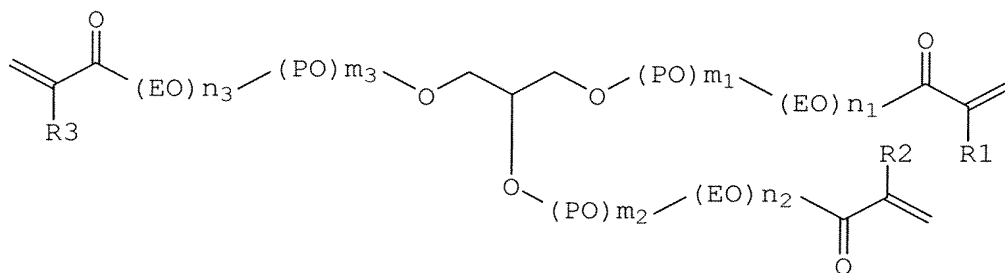
## VII. SUMMARY OF CLAIMED SUBJECT MATTER

The claimed subject matter relates to (meth)acrylic esters of polyalkoxylated glycerol (claims 1 and 4-6), a process for preparing the (meth)acrylic esters (claims 7 and 10-13), a process for preparing a crosslinked hydrogel using the (meth)acrylic esters (claims 14-16), a composition for preparing a crosslinked hydrogel (claims 21 and 22), a crosslinked hydrogel prepared from the (meth)acrylic esters (claims 18, 23, 26, 27, and 32-34), and articles comprising the crosslinked hydrogel (claims 29 and 30). Application specification, page 5, lines 5-26; page 7, lines 22-33; page 8, lines 17-31; and page 33, lines 17 and 18. The inventors have found that improved liquid absorbency properties are exhibited by hydrogels when a claimed (meth)acrylic ester of polyalkoxylated glycerol is used as a crosslinking agent. Specification, page 51, Tables 1 and 2.

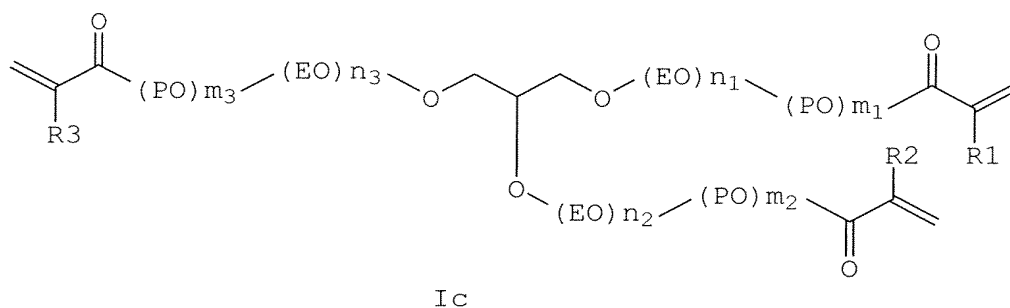
The recited (meth)acrylic esters of claim 1 contain a glycerol base, wherein each hydroxy group of the glycerol is alkoxyated with ethoxy *and* propoxy groups in *each* of the three alkylene oxide chains. The recited (meth)acrylic esters of claim 1 have the following structures Ia, Ib, and Ic:



Ia



Ib



wherein AO is for each AO independently EO or PO,

EO is O-CH<sub>2</sub>-CH<sub>2</sub>,

PO is at each instance independently O-CH<sub>2</sub>-CH(CH<sub>3</sub>)- or O-CH(CH<sub>3</sub>)-CH<sub>2</sub>-

a sum of m<sub>1</sub> + m<sub>2</sub> + m<sub>3</sub> + n<sub>1</sub> + n<sub>2</sub> + n<sub>3</sub> is 3, 4, or 5,

a sum of m<sub>1</sub> + m<sub>2</sub> + m<sub>3</sub> is 1, 2, 3, or 4,

a sum of p<sub>1</sub> + p<sub>2</sub> + p<sub>3</sub> is 3, 4, or 5, and

R<sub>1</sub>, R<sub>2</sub>, and R<sub>3</sub> are independently H or CH<sub>3</sub>,

wherein at least one AO is PO and at least one further AO is EO.

Specification, page 5, line 10 through page 7, line 2.

The total number of alkoxy groups in (meth)acrylic esters Ia, Ib, and Ic is 3, 4, or 5. Specification, page 5, line 10 through page 7, line 2. Specific numbers of alkoxy groups and specific identities of alkoxy groups are recited in claims 4-6. Specification, page 7, lines 4-13.

The (meth)acrylic esters of polyalkoxylated glycerol recited in claims 1 and 4-6 are prepared by a simplified process. Specification page 5, lines 5-8. Claim 7 recites the simplified process, as disclosed in the specification at page 7, lines 22-40, wherein an excess molar amount (at least 3.15 to 1) of (meth)acrylic acid is used in the process and remains in the reaction mixture. Claim 13 recites that this excess molar amount of (meth)acrylic acid is at least 15:1 (specification page 8, lines 12-13 and page 23, lines 6-9).

Claim 10 recites that the (meth)acrylic acid is not more than 75% by weight removed from the reaction mixture obtained after the last process step (specification, page 23, lines 19-20), and claim 11 recites that the reaction mixture after the last process step has an acid number of at least 25 mg of KOH/g (specification, page 23, lines 32-34). Claim 12



recites that the reaction mixture, after the last step, has a (meth)acrylic acid content of at least 0.5%, by weight.

The claims also are directed to a process for preparing a crosslinked hydrogel using a (meth)acrylic ester of claim 1 or an ester formula Ia, wherein an alkoxy chain can be solely ethoxy or solely propoxy, as crosslinking agents for (meth)acrylic acid (claim 14). Specification, page 25, lines 21-30; page 28, line 19; and page 32, line 6-13. Claim 15 recites that AO of compound Ia of claim 14 is EO. Specification, page 5, line 28. Claim 16 recites additional process steps for preparation of a crosslinked hydrogel after performing the process of claim 7. Specification page 25, lines 21-30, page 28, lines 1-9, and page 32, lines 6-13.

Claim 26 recites a crosslinked hydrogel prepared by the process of claim 14 and having a saponification index of less than 11. Specification, page 33, lines 1-5 and page 51, Table 2. Claim 27 recites a crosslinked hydrogel prepared by the process of claim 14 and having an residual crosslinker content of less than 10 ppm. Specification, page 33, lines 7-12 and page 51, Table 2. Claims 32-34 recite crosslinked hydrogels having a saponification index of less than 8, or less than 5 (specification, page 33, lines 1-5), or a residual crosslinker content of less than 5 ppm (specification, page 33, lines 7-12).

Claim 18 recites a crosslinked hydrogel comprising a hydrophilic monomer in polymerized form crosslinked with a (meth)acrylic ester of claim 1 or an ester of formula Ia wherein an alkoxy chain can be solely ethoxy or solely propoxy and the total number of alkoxy groups is 3 or 4. The crosslinked hydrogel is prepared using a composition of claim 21. Specification, page 24, line 27-page 25, line 4. Claim 22 recites that the composition of claim 21 further comprises a diluent G. Specification, page 25, lines 3 and 4, and page 28, lines 23-25. Claim 23 recites a crosslinked hydrogel, optionally postcrosslinked, prepared from a composition of claim 21. Specification, page 27, lines 33-35.

Claims 29 and 30 recite an article comprising a polymer prepared by the method of claim 14, wherein the article can be a hygiene article, a packaging material, or a monomer. Specification, page 33, lines 17 and 18, and page 34, lines 32-33.

**VIII. GROUND OF REJECTION TO BE REVIEWED ON APPEAL**

Whether claims 1 and 4-6 are anticipated under 35 U.S.C. §102(b) by Matsui et al. EP 0 777 287 (EP '287).

Whether claims 7 and 10 are anticipated under 35 U.S.C. §102(b) by Barthold et al. U.S. Patent No. 5,472,617 ('617).

Whether claims 11-13 would have been obvious under 35 U.S.C. §103 over the '617 patent.

Whether claims 14-16 are anticipated under 35 U.S.C. §102(b) by the '617 patent.

Whether claims 18 and 21-23 are anticipated under 35 U.S.C. §102(b) by the '617 patent.

Whether claims 26, 27, 29, 30, and 32-34 are anticipated under 35 U.S.C. §102 by, or alternatively, would have been obvious under 35 U.S.C. §103 over, the '617 patent.

For purposes of the issues on appeal, claims 4-6 are grouped and argued with claim 1.

Claims 10-13 are grouped with claim 7 to form a second group that is separately argued.

Claims 15, 26, 27, 29, 30, and 32-34 are grouped with claim 14 and claim 16 to form a third group that is separately argued.

Claims 18 and 21-23 form a fourth group that is separately argued.

**IX. ARGUMENT****A. INTRODUCTION**

Appellants submit that the rejections issued in the final Office Action are in error, and that the present application is in condition for allowance. Appellants respectfully request the Board to review and reverse each of the rejections issued in the final Office Action.

**B. PROPER BASIS FOR A §102(B) ANTICIPATION REJECTION**

"Anticipation requires a showing that each limitation of a claim is found in a single reference, either expressly or inherently." *Atofina v. Great Lakes Chemical Corp.*, 441 F.3d 991, 999 (Fed. Cir. 2006).

When a claim recites a limitation as a range of numerical values, a reference must describe the range with sufficient specificity to anticipate. *Atofina*, 441 F.3d at 999-1000. Disclosed ranges that only slightly overlap a claimed range do not describe the range with sufficient specificity. See *id.* (reversing findings of anticipation on the basis that (1) a disclosed temperature range of 150 to 350°C only slightly overlapped a claimed range of 330 to 450°C, and (2) a disclosed concentration range of 0.001 to 1.0% only slightly overlapped a claimed range of 0.1 to 5.0%); *Ex parte Hayashi*, 2007 WL 1874815, \*5-6 (B.P.A.I. 2007) (Appeal No. 2007-0665) (reversing an anticipation rejection, finding that a disclosed thickness range of about 100 nm to 500 nm, absent any specific examples less than 100 nm, failed to describe a claimed thickness range of less than 100 nm with sufficient specificity). Further, a reference disclosing a range that is very close to (but which does not overlap or touch) the claimed range does not anticipate the claimed range. MPEP §2131.02(II)(8<sup>th</sup> ed., Rev. 6, Sept. 2007) (citing *Titanium Metals Corp. v. Banner*, 778 F.2d 775 (Fed. Cir. 1985)).

The disclosure of a genus in the prior art is not necessarily a disclosure of every specie that is a member of the disclosed genus. *Atofina*, 441 F.3d at 999. In particular, the disclosure of a range does not constitute a specific disclosure of the endpoints of that range. See *id.* at 1000 (noting that a disclosed range of 150 to 350°C was neither a disclosure of 150°C nor 350°C); see also *Hayashi* at \*6 (finding it irrelevant that the lower limit of "about 100 nm" or the disclosed thickness range could be interpreted to include thicknesses

within the recited range of "less than 100 nm"); *Ex parte Hayes*, 2007 WL 49708, \*9 (B.P.A.I. 2007) (Appeal No. 2006-0990) (noting that end points of a disclosed range do not reflect "data points" for anticipation determination).

With further respect to a rejection under 35 U.S.C. §102(b), MPEP §2131 states:

"TO ANTICIPATE A CLAIM, THE REFERENCE MUST TEACH EVERY ELEMENT OF THE CLAIM"

'A claim is anticipated only if each and every elements as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.' *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987)... 'The identical invention must be shown in as complete detail as is contained in the...claim.' *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). The elements must be arranged as required by the claim, but this is not an *ipsissimis verbis* test, i.e., identity of terminology is not required. In *re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990)."

In addition, MPEP §2131.03 II. states:

"PRIOR ART WHICH TEACHES A RANGE WITHIN, OVERLAPPING, OR TOUCHING THE CLAIMED RANGE ANTICIPATES IF THE PRIOR ART RANGE DISCLOSES THE CLAIMED RANGE WITH "SUFFICIENT SPECIFICITY"

When the prior art discloses a range which touches, overlaps or is within the claimed range, but no specific examples falling within the claimed range are disclosed, a case by case determination must be made as to anticipation. In order to anticipate the claims, the claimed subject matter must be disclosed in the reference with "sufficient specificity to constitute an anticipation under the statute." What constitutes a "sufficient specificity" is fact dependent. If the claims are directed to a narrow range, the reference teaches a broad range, depending on the other facts of the case, it may be reasonable to conclude that the narrow range is not disclosed with "sufficient specificity" to constitute an anticipation of the claims. The unexpected results may also render the claims unobvious. The question of "sufficient specificity" is similar to that of "clearly envisaging" a species from a generic teaching. See MPEP § 2131.02. A 35 U.S.C. 102/ 103 combination rejection is permitted if it is unclear if the reference teaches the

range with "sufficient specificity." The examiner must, in this case, provide reasons for anticipation as well as a motivational statement regarding obviousness. *Ex parte Lee*, 31 USPQ2d 1105 (Bd. Pat. App. & Inter. 1993) (expanded Board). For a discussion of the obviousness of ranges see MPEP § 2144.05."

Two recent CAFC decisions support the reasoning stated in MPEP §2131.03

II. In *Eli Lilly & Co. v. Zenith Goldline Pharm. Inc.*, 81 U.S.P.Q. 2d, 1324 (Fed. Cir. 2006), the court stated that for a reference to anticipate a claim, the reference must *expressly* spell out a definite and limited class of compounds that enable a person skilled in the art to at once envisage each member of this limited class.

In *Impax Labs, Inc. v. Aventis Pharma Inc.*, 468 F.3d 1366 (Fed Circ. 2006), the court stated that the prior art patent disclosed such a large number of compounds that one of ordinary skill in the art would not have recognized that the claimed compound was useful to treat a disease without additional details or guidance, which was not found in the prior art patent.

Also see *In re Petering and Fall*, 133 USPQ 275, 299 (C.C.P.A. 1962), cited in *Impax Labs*, wherein the court stated:

"Next we consider the legal effect of the generic and specific descriptions of isoalloxazine structures in the Karrer patent. The generic formula of Karrer, "wherein X, Y, Z, P, and R' represent either hydrogen or alkyl radicals, R a side chain containing an OH group," encompasses a vast number and perhaps even an infinite number of compounds since there is no express limit on the size of the alkyl group or the structure and size of R. Even though appellants' claimed compounds are encompassed by this broad generic disclosure, we do not think this disclosure by itself *describes* appellants' invention, as defined by them in any of the appealed claims, within the meaning of 35 U.S.C. 102(b)."

### C. PROPER BASIS FOR A §103(a) OBVIOUSNESS REJECTION

A determination that a claimed invention would have been obvious under §103(a) is a legal conclusion involving four factual inquiries: (1) the scope and content of the prior art; (2) the differences between the claimed invention and the prior art; (2) the differences between the claimed invention and the prior art; (3) the level of ordinary skill in the pertinent art; and (4) secondary considerations, if any, of non-obviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966). Secondary considerations of non-obviousness include factors such as commercial success, long-felt but unresolved needs, the failure of others, and/or *unexpected results achieved by the claimed invention*. *Id.* Obviousness is determined from the vantage point of a hypothetical person having ordinary skill in the art which the claimed subject matter pertains, who is presumed to have all prior art references in the field of the invention available to him/her. In *re Rouffet*, 149 F.3d 1350, 1357 (Fed. Cir. 1998). Furthermore, obviousness must be determined as of the time the invention was made and in view of the state of the art that existed at that time. *Uniroyal Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 1050-51 (Fed. Cir. 1988).

The Patent Office must clearly articulate facts and reasons why the claimed invention "as a whole" would have been obvious to a hypothetical person having ordinary skill in the art at least as of the claimed invention's effective filing date. *KSR Int'l Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1741 (2007) (citing with approval *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) ("[R]jections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.")); see also MPEP §2143 ("The key to supporting any rejection under 35 U.S.C. §103 is the clear articulation of reason(s) why the claimed invention would have been obvious.").

To reach a proper determination under 35 U.S.C. §103(a), the examiner must step backward in time and into the shoes worn by the hypothetical "person of ordinary skill in the art" when the invention was unknown and just before it was made. In view of all factual information, the examiner must then make a determination whether the claimed invention "as a whole" would have been obvious at that time to that person. Knowledge of applicants' disclosure must be put aside in reaching this determination, yet kept in mind in

order to determine the "differences," conduct the search, and evaluate the "subject matter as a whole" of the invention. The tendency to resort to "hindsight" based upon applicants' disclosure is often difficult to avoid due to the very nature of the examination process. However, impermissible hindsight must be avoided and the legal conclusion must be reached on the basis of the *facts* gleaned from the prior art. MPEP §2142.

Furthermore, to establish a *prima facie* case of obviousness, the examiner must satisfy three requirements. First, as the U.S. Supreme Court very recently held in *KSR International Co. v. Teleflex Inc. et al.*, 127 S.Ct. 1727 (2007), "a court must ask whether the improvement is more than the predictable use of prior art elements according to their established functions. ...it [may] be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was *an apparent reason* to combine the known elements in the fashion claimed by the patent at issue. ...it can be important to *identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements* in the way the claimed new invention does... because inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known." (emphasis added, *KSR, supra*). Second, the proposed modification of the prior art must have had a reasonable expectation of success, determined from the vantage point of the skilled artisan at the time the invention was made. *Amgen Inc. v. Chugai Pharm. Co.*, 18 USPQ2d 1016, 1023 (Fed. Cir. 1991). Lastly, the prior art references must teach or suggest all the limitations of the claims. *In re Wilson*, 165 USPQ 494, 496 (C.C.P.A. 1970).

As recently articulated by the Court of Appeals for the Federal Circuit in *Ortho-McNeil Pharmaceutical Inc. v. Mylan Laboratories Inc.*, 86 USPQ 2d, 1196, 1201-2 (Fed. Cir. 2008):

"As this court has explained, however, a flexible TSM test remains the primary guarantee against a non-statutory hindsight analysis such as occurred in this case. *In re Translogic Tech., Inc.* 504 F.3d 1249, 1257 [84 USPQ 2d 1929] (Fed. Cir. 2007) ("[A]s the Supreme Court suggests, a flexible

approach to the TSM test prevents hindsight and focuses on evidence before the time of invention.)."

Once the Patent Office properly sets forth a prima facie case of obviousness, the burden shifts to the applicants to come forward with evidence and/or argument supporting patentability. *See In re Glaug*, 283 F.3d 1335, 1338 (Fed. Cir. 2002). Rebuttal evidence is merely a showing of facts supporting the opposite conclusion." *In re Piasecki*, 745 F.2d 1468,1472 (Fed. Cir. 1984). Evidence rebutting a prima facie case of obviousness can include: (a) "evidence of unexpected results," *Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348 1369 (Fed. Cir. 2007); (b) "evidence that the prior art teaches away from the claimed invention in any material respect," *In re Peterson*, 315 F.3d 1325, 1331 (Fed. Cir. 2003); and, (c) evidence of secondary considerations, such as commercial success or long-felt yet unmet needs, *WMS Gaming, Inc. v. International Game Tech.*, 184 F.3d 1339, 1359 (Fed. Cir. 1999). The Patent Office must always consider such evidence supporting patentability. *See, e.g., In re Sullivan*, 498 F.3d 1345, 1352-53 (Fed. Cir. 2007) (reversing a Patent Office decision of obviousness because the Patent Office failed to consider the applicants' evidence rebutting a prima facie case of obviousness because the Patent Office failed to consider the applicants' evidence rebutting a prima facie case of obviousness). If the Patent Office determines that such evidence is not compelling or is insufficient, then the Patent Office should specifically set forth the facts and reasoning supporting that determination. MPEP §2145 (8<sup>th</sup> Ed., Rev. 6, Sept. 2007).

**D. REJECTION OF CLAIMS 1 AND 4-6 UNDER 35 U.S.C. §102(B) AS BEING ANTICIPATED BY MATSUI ET AL. EP PATENT NO. 0 777 287**

Compound claims 1 and 4-6, directed to (meth)acrylic esters of polyalkoxylated glycerin, stand rejected under 35 U.S.C. §102(b) as being anticipated by EP 0 777 287 (EP '287) based on the assertion that EP '287 discloses the ester F of claim 1.

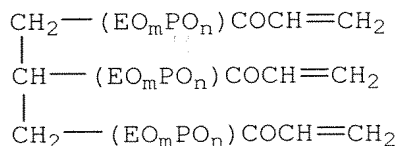
**1. Disclosure of EP '287**

EP '287 is directed to non-aqueous electrolyte batteries having a negative electrode coated with a polymer film prepared from the compounds disclosed in EP '287. The EP '287 reference fails to teach copolymerization of the disclosed compounds, fails to suggest use of the compounds as a crosslinker for monoethylenically unsaturated monomers,



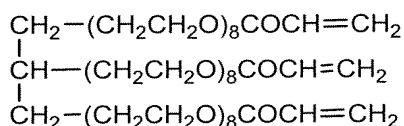
and is in no way related to superabsorbent polymers (SAPs) and a reduction of residual monomers in the production of SAPs.

The EP '287 rejection is based on formula (2), i.e., the *sole* glycerin-based compound of EP '287, having a formula:



wherein m and n do not represent 0 at the same time and  $0 \leq n$  and  $0 \leq m$  (EP '287, page 4, line 32). Accordingly, either EO *or* PO can be absent from the compound, and *no* "upper limit" exists for m, n, or the sum of m+n. EP '287 therefore discloses an infinite number of compounds.

In EP '287, the sole example directed to a glycerin-based compound is Embodiment 4, wherein n=8 and m=0, illustrated as compound (7) at page 8 of EP '287. This compound, having the following formula, is (a) *free* of PO units and (b) contains a sum of 24 EO units.



## 2. Rejection of Claims 1 and 4-6 as Anticipated by EP '287

Claims 1 and 4-6 stand rejected under 35 U.S.C. §102(b) as being anticipated by EP '277. Appellants submit that claims 1 and 4-6 are not anticipated by EP '277 because EP '287 fails to disclose the recited esters with sufficient specificity to anticipate claims 1 and 4-6, as required by *Atofina*.

Claims 1 and 4-6 are directed to an ester F that *requires* the presence of *both* PO *and* EO units in *each* of the three alkylene oxide chains of the claimed glycerin compound. In addition, the total number of EO and PO units in a claimed ester F (not in each alkylene oxide chain) is 3, 4, or 5, as recited. It is submitted, therefore, that even though the

very general, broad teachings of EP '287 may encompass a presently claimed ester F, EP '287 does not anticipate claims 1 and 4-6 under 35 U.S.C. §102(b).

The teachings of EP '287 are to a broad a range of compounds, including both glycerin-based compounds and trimethylolpropane-based compounds. EP '287 discloses an infinite number of compounds because no upper limit is placed on either variable "m" or "n". In addition, either "m" or "n", but not both, can be zero. The reference therefore fails to disclose the genus of compounds therein with any specificity.

The *sole* specific example in EP '287 directed to glycerin-based compounds is compound (7) which contains 24 EO groups and no PO groups, as illustrated above. Accordingly, EP '287 fails to disclose any specific examples encompassed by the claimed compounds, i.e., a glycerin-based compound containing *both* EO and PO groups, wherein the sum of EO and PO is in the claimed narrow range of 3 to 5. All examples in EP '287 contain from 18 to 48 total EO and/or PO units.

As set forth in the MPEP §2131, the present claims are directed to a narrow range within the wide range of the reference, wherein the reference fails to disclose a specific example within the claimed range. It is submitted therefore that EP '287 fails to disclose the claimed subject matter with sufficient specificity to constitute an anticipation under 35 U.S.C. §102(b).

The esters of EP '287 and claimed esters are considerably different, spanning entirely different multiples of total EO and PO units. This level of dissimilarity falls even further below the threshold anticipation requirement of "sufficient specificity" set forth in *Atofina*, where even *slightly overlapping* disclosed and recited ranges were held non-anticipatory. *Atofina*, 441 F.3d at 999-1000; *see also Hayashi* at \*5-6.

Accordingly, EP '287 does not disclose the recited compounds with sufficient specificity and appellants submit that the rejection of claims 1 and 4-6 under 35 U.S.C. §102(b) should be reversed.

### 3. Non-obviousness of Claims 1 and 4-6

EP '287 fails to anticipate claims 1 and 4-6 and EP '287 fails to render claims 1 and 4-6 obvious under 35 U.S.C. §103. In particular, the presently claimed esters exhibit unexpected benefits in the preparation of superabsorbent polymers (SAPs) compared to polyalkoxylated esters similar to those disclosed in EP '287.

The present specification, Table 1 at page 51, includes seven esters (a through g) that are used as crosslinkers in the preparation of an SAP. Examples f and g are comparative because they (a) are based on trimethylolpropane (TMP), (b) contain only EO units, and (c) contain more than a total of 5 EO and PO groups, i.e., Example g. Examples c-e are esters of present claim 1, i.e., based on glycerin, contain EO *and* PO units, and contain a total of up to 5 PO and EO units. Comparative Example g is the most similar example to the EP '287 disclosure, i.e., based on TMP, containing only EO units, and containing 15 EO units. See Embodiment 1 of EP '287, based on TMP and containing 18 EO units and no PO units. The only embodiment of EP '287 based on glycerin contains *only* EO and the total number of EO units is 24.

The data in Table 2 of the specification show that claimed esters c-e provide an SAP having a very low crosslinker residue (over replicate tests) of from less than 5 to 10 ppm. In contrast, a crosslinker based on TMP and containing 15 EO units (i.e., g) provided an SAP having a 20 to 51 ppm crosslinker residue. A comparative crosslinker based on TMP and containing 3 EO units provided an SAP having 857 to 1302 ppm of residual crosslinkers.

In addition, the claimed esters c-e provided SAPs having a VSI value (saponification index) of 7.5 to 9.5. Comparative TMP-based esters f and g demonstrated a VSI value of 36.9 and 11.6, respectively.

The presently claimed esters therefore show unexpected results with respect to crosslinker residue, which ideally is zero to avoid free monomers in the resulting SAP or the need to perform a method step to remove the crosslinker residue. Unexpected results also are demonstrated with respect to VSI values. As stated in the specification, an ideal crosslinker has a VSI of zero because all crosslinking is performed during the reaction, as opposed to

during a drying step. In turn, the properties of the SAP are not altered by the drying process. See specification, page 50, lines 1-6.

In addition, the test data discussed above shows the unpredictability in the art. In particular, either changing from glycerin to TMP, or excluding PO, or containing more than 5 total EO and PO groups, results in crosslinking agents that vary considerably with respect to residual monomers remaining after a polymerization. It is the presently claimed compounds, i.e., based on the glycerin, containing both EO and PO, and 3 to 5 total EO/PO moieties that provided the unexpected results. These results could not have been predicted from the broad disclosure of EP '287.

In view of the broad disclosure of EP '287, including (a) trimethylolpropane and glycerin-based triacrylates, (b) that the disclosed compounds can be free of either EO or PO units, (c) that the number of disclosed compounds is infinite (i.e., one of  $m \leq 0$  and/or  $n \leq 0$ ), (d) that the examples are primarily directed to TMP-based compounds, and (e) that the only glycerin-based example contains 24 EO units only, *and* the unpredictability in the art, *and* the demonstrated unexpected results, it is submitted that EP '287 cannot render claims 1 and 4-6 obvious under 35 U.S.C. §103.

The present claims are closely tailored to be based on glycerin, contain EO *and* PO units, and contain a total *sum* of EO and PO units of 3, 4, or 5, wherein the esters demonstrate unexpected results with respect to performing as a crosslinking agent for an SAP. EP '287 is directed to homopolymers, and the disclosed esters are not used, or even considered, as crosslinking agents. EP '287 also fails to disclose the presently claimed esters with any specificity, and fails to provide any direction, guidance, or apparent reason for a person skilled in the art of SAPs to select the narrow range of claimed compounds from the infinite number of compounds in the reference (which is directed to a non-aqueous electrolyte secondary battery) with any reasonable expectation of providing a crosslinker for SAPs having unexpectedly improved properties over SAPs crosslinked with other esters also broadly disclosed in EP '287 and closer in structure to the examples of EP '287.

For all of the reasons set forth above, appellants submit that claims 1 and 4-6, in addition to being not anticipated by EP '287, would not have been obvious to a person skilled in the art under 35 U.S.C. §103 over EP '287.

#### **4. Response to Examiner Arguments in Advisory Action**

In the Advisory Action mailed February 2, 2008, the examiner states:

"every point disclosed in the range taught by Matsui et al. is adequate for a 102(b) rejection. Regarding unexpected results, applicants must recognize that the submission of unexpected results is not effective in overcoming a 102 based rejection."

The examiner apparently is ignoring case law and the MPEP with respect to 35 U.S.C. §102(b) rejections. For example, in the *Eli Lilly* case discussed above, the court stated that for a reference to anticipate a claim, the reference must expressly spell out a *definite* and *limited* class of compounds that enable a person skilled in the art to at once envisage each member of this limited class. MPEP §2131.03 II also recites "clearly envisaging" a species from a generic teaching. Also see MPEP §2131.02. Also see *Impax Labs* above. Because '287 discloses infinite class of compounds, with no specific example close in structure to the claimed esters, it is submitted that EP '287 cannot anticipate claims 1 and 4-6.

With respect to appellants discussion of unexpected results and the nonobviousness of claim 1 and 4-6, see the discussion in Section IX.B. above, citing MPEP §2131.03 II, which states that "[T]he unexpected results may also render the claim unobvious." Appellants have taken the extra step to demonstrate the nonobviousness of claims 1 and 4-6.

#### **E. REJECTION OF CLAIMS 7 AND 10 UNDER 35 U.S.C. §102(B) AS BEING ANTICIPATED BY BARTHOLD ET AL. U.S. PATENT NO. 5,472,617 ('617) AND REJECTION OF CLAIMS 11-13 UNDER 35 U.S.C. §103 AS BEING OBVIOUS OVER THE '617 PATENT.**

Independent claim 7, and claims 10-13 depending therefrom, are directed to methods of preparing the (meth)acrylate esters of polyalkoxylated glycerin of claim 1. The 102(b) rejection is based on an assertion that the '617 patent purportedly discloses stripping with a gas which is inert under the reaction conditions. The rejection under §103 is based on

an assertion that claimed process is similar to the '617 process, with minimum variations, and that routine experimentation would lead to the claimed process.

### **1. Disclosure of the '617 Patent**

The '617 patent is directed to a method of demulsifying a crude oil and water mixture using copolymers of (meth)acrylic acid and hydrophilic comonomers. The copolymers are prepared by copolymerizing a (meth)acrylate of an alkoxyated alcohol, diol, or triol with a comonomer, e.g., acrylic acid.

The '617 process of preparing an alkoxyated (meth)acrylic ester is disclosed in the Examples, which the examiner relies upon to support the §102(b) and §103 rejections. See '617 patent, column 8, line 65 through column 11, line 6. In this process, an alkoxyated trimethylolpropane (TMP) is mixed with acrylic acid *under a nitrogen atmosphere* and the reaction is allowed to proceed to yield an acrylic ester of alkoxyated TMP (column 10, line 52 through column 11, line 6). The nitrogen atmosphere is applied prior to and maintained during the reaction. After the reaction is complete, the '617 patent teaches that the mixture is cooled, then reacted with acetic anhydride (column 11, lines 2-5).

The '617 patent also disclose that one equivalent of (meth)acrylic acid is used per equivalent of hydroxyl groups in the alkoxyated alcohol. Specifically, the '617 patent, at column 4, line 63 through column 5, line 1 states:

"The ratio of the oxyalkylated alcohol to acrylic acid or methacrylic acid may be varied from 1:1 to 1:n, where n is the functionality (i.e. the number of hydroxyl groups) of the starting alcohol. A ratio of 1:1 is preferred, since otherwise gelling may be observed during the subsequent polymerization."

The '617 patent therefore discourages, and actually teaches away, from using an excess amount of (meth)acrylic acid in the reaction with the alkoxyated alcohol.

### **2. Rejection of Claims 7 and 10 as Anticipated by the '617 Patent**

Claims 7 and 10 stand rejected under 35 U.S.C. §102(b) as being anticipated by Barthold et al. U.S. Patent No. 5,472,617 ('617). The examiner bases this rejection on a assertion that the '617 patent purportedly discloses stripping with a gas which is inert under the reaction conditions.

It is submitted that differences exist between claims 7, 10, and 16 such that a rejection under 35 U.S.C. §102(b) cannot be sustained. The fact that the '617 patent teaches a nitrogen blanket during polymerization, rather than solvent stripping *after* polymerization, is a substantial difference between claim 7 and the '617 patent disclosure. For example, the presently claimed stripping step i) is performed *after* the reaction between the alkoxylated glycol and the (meth)acrylic acid to form the ester F. See specification, page 22, lines 14-20, disclosing a "solvent stripping operation i)". Also see specification, page 21, line 24 through page 22, line 12, further disclosing the solvent removal steps. In contrast, the '617 patent teaches a nitrogen atmosphere over a reaction between an alkoxylated trimethylolpropane (Example a5) and acrylic acid ('617 patent, column 10, lines 41-55), which alone is a difference that precludes a rejection under 35 U.S.C. §102(b).

One major difference between claims 7 and 10 and the '617 patent is that "stripping" is different from a "nitrogen atmosphere". Attached hereto as Exhibit A from *Hawley's Condensed Chemical Dictionary, Thirteen Ed.* (1997), page 1052, is a definition of "stripping" showing that the term refers to the removal of volatile components from a liquid mixture by the passage of a gas through the liquid mixture. Present stripping step i) removes a solvent from the reaction mixture *after* the polymerization.

Another major difference between the '617 patent and claims 7 and 10 is that the stripping is performed using an "oxygen-containing gas", as presently recited in amended claim 7. The teachings of the '617 patent are limited to nitrogen gas. See specification at page 22, lines 4-7 and 34-36, for example. An oxygen-containing gas is utilized in the stripping step to maintain the inhibitory capabilities of a compound like MEHQ during solvent removal, i.e., to inhibit premature polymerization of the formed ester F. It is well-known in the art that oxygen must be present to maintain this polymerization inhibitory capability. See Exhibit B submitted concurrently with this amendment, an excerpt from "Modern Superabsorbent Polymer Technology" (1998), page 39-44, showing the influence of oxygen on polymerization inhibition.

The '617 patent utilizes a nitrogen blanket to help *remove* oxygen from the reaction system, such that the inhibition capabilities of MEHQ are reduced and the polymerization can proceed. The disclosed "nitrogen blanket" is not a stripping function, but,

as well known in the art, is applied over a reaction mixture in the '617 patent to *preclude* the introduction of oxygen into the reaction system. Accordingly, the "nitrogen blanket" of the '617 patent and the "stripping" stages are not identical (e.g., are performed at different steps of the reaction and perform different functions).

In addition, claim 7 also recites a process for preparing an ester F in the presence of a molar excess of (meth)acrylic acid to alkoxyated glycol of at least 3.15:1. The '617 patent fails to teach or suggest a molar excess of at least 3:15:1 of (meth)acrylic acid in the reaction mixture. In contrast, the '617 patent, at column 4, line 63 through column 5, line 1, quoted above, specifically teaches a 1:1 molar ratio (per hydroxyl group of the alcohol) of oxyalkylated alcohol to (meth)acrylic acid, and that an excess of (meth)acrylic acid *should* be *avoided* or gelling may occur.

With respect to claim 10, the '617 patent teaches that a 1:1 molar ratio of oxyalkylated alcohol to (meth)acrylic acid should be used. Therefore, the resulting reaction product cannot contain an excess amount (meth)acrylic acid. In addition, a step of removing no more than 75% by weight of excess (meth)acrylic acid is neither taught nor suggested in the '617 patent, and cannot be taught because no excess (meth)acrylic acid is present in the reaction mixture. These are additional reasons why the '617 patent fails to anticipate claim 10 under 35 U.S.C. §102(b).

For all the reasons set forth above, appellants submit that the rejection of claims 7 and 10 under 35 U.S.C. §102(b) should be reversed.

**3. Non-Obviousness of Claims 7 and 10 and Rejection of Claims 11-13 under 35 U.S.C. §103 as Being Obvious over the '617 Patent**

Claims 11-13, which depend from claim 7, also stand rejected under 35 U.S.C. §103 as being obvious over the '617 patent. The examiner relies upon a contention of "routine experimentation" to support the rejection. Although not formally rejected under 35 U.S.C. §103, claims 7 and 10 also would not have been obvious over the '617 patent under 35 U.S.C. §103.

In order to support a rejection under 35 U.S.C. §103, the reference must render the invention obvious *as a whole*. In this regard, claim 7 recites a process for preparing an



ester F in the presence of a molar *excess* of (meth)acrylic acid to alkoxyated glycol of at least 3:15:1. In contrast, the '617 patent specifically teaches that a molar excess of (meth)acrylic acid should be *avoided*. See '617 patent, column 4, line 63 through column 5, line 1 (quoted above). The examiner completely ignored the claimed feature of excess (meth)acrylic acid, and as a result has failed to consider the invention as a whole. Also see claim 10, wherein no more than 75% of the excess (meth)acrylic acid is removed from the reaction mixture, and claim 13, which recites a molar excess of (meth)acrylic acid to alkoxyated glycol of *at least 15:1*. It is readily apparent that the '617 patent not only discourages the use of an excess molar amount of (meth)acrylic acid, but actually teaches away from the claimed invention.

With respect to the claimed feature of stripping with a gas, at column 10, line 52 through column 11, line 2, the '617 patent discloses *reacting* an alkoxyated alcohol with acrylic acid "under a nitrogen blanket". This is not equivalent to the stripping step i) recited in claim 7. The difference between a "nitrogen blanket" of the '617 patent and "stripping" with an oxygen-containing gas is discussed above in Section IX.E.2.

A proper *prima facie* case of obviousness *requires* that the prior art reference teach or suggest *all* of the limitation of the claims. The '617 patent fails to teach a "stripping step" *or* using an "oxygen-containing gas". For these reasons alone, a case of *prima facie* obviousness of claims 7 and 10 in view of the '617 patent cannot be sustained.

Furthermore, a person skilled in the art would not substitute a stripping step with an oxygen containing gas for a nitrogen blanket because a nitrogen blanket removes oxygen to facilitate a reaction, whereas an oxygen-containing gas *retards* a premature reaction, or inhibits the reaction. Thus, there is no apparent or common sense reason for such a substitution. The substitution would not accomplish what the prior art teaches, but would *defeat* the desired result.

As stated above, the '617 patent also fails to teach or suggest a mole excess of at least 3:15:1 of (meth)acrylic acid in the reaction mixture. The '617 patent fails to consider or address using such mole excess of (meth)acrylic acid, and provides no apparent reason for a person skilled in the art to use such a molar excess of (meth)acrylic acid. In contrast, the '617 patent, at column 4, line 63 through column 5, line 1, specifically teaches a 1:1 molar

ratio (per hydroxyl group of the alcohol) of oxyalkylated alcohol to (meth)acrylic acid, and that an excess of (meth)acrylic acid should be avoided.

The '617 patent fails to teach every feature of claims 7 and 10, and, in fact, fails to teach more than one feature of these claims. The '617 patent fails to teach or suggest a solvent stripping step, or using an excess molar amount of (meth)acrylic acid, let alone both claimed features, *and* fails to provide any apparent reason for performing such steps. Claims 7 and 10, therefore, would not have been obvious under 35 U.S.C. §103 over the '617 patent.

The examiner also has failed to articulate clear reasons why the presently claimed invention, as a whole, would have been obvious over the '617 patent. Numerous jumps in reasoning would have been required to arrive at the present invention after reading the '617 patent, one of which is expressly taught as being avoided by the '617 patent. The '617 patent therefore does not provide an incentive or apparent reason for a person skilled in the art to modify the '617 patent in a manner needed to arrive at the presently claimed invention. In summary, process claims 7 and 10 are patentable over the cited '617 patent, and the rejection should be withdrawn.

Claims 11-13, which depend from claim 7, stand rejected under 35 U.S.C. §103 as being obvious over the '617 patent. For the reasons set forth above, it is submitted that claims 11-13 also are patentable over the '617 patent for same of the reasons that claims 7 and 10 are patentable over the cited '617 patent.

The totality of the examiner's reasoning supporting this rejection is found at page 6 of the Office Action stating:

"7. Claims 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barthold et al. (US 5,472,617).

Set forth from paragraph 7 of instant office action, the process of Barthold et al. is very similar to the process of claims 11-13.

The difference between the invention of claims 11-13 and Barthold et al. is that Barthold et al. do not disclose minor variations of the process as claimed.

Nevertheless, Barthold et al. (col. 8, line 65 to col. 9, line 40; col. 9, Table 1; col. 11, Table 3) have clearly disclosed a process for preparing the compound ester F as claimed. Therefore, the examiner believes that it would have been obvious to one of ordinary skill in art to use "routine experimentation" technique to optimize the process of Barthold et al. to obtain the invention of claims 11-13. In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955)."

The examiner has totally failed to articulate reasons why claims 11-13 would have been obvious over the '617 patent, except for a conclusory statement relating to "routine experimentation" and "very similar" processes. As stated above in Section IX.C., the Patent Office *must* make it clear in the record with *facts* and *reasoning* that the teaching-suggestion-motivation to modify the reference exists. Regardless of the rationale supporting a conclusion of obviousness the Patent Office must clearly articulate facts and reasons why the claimed invention "as a whole" would have been obvious to a hypothetical person having ordinary skill in the art at least as of the claimed invention's effective filing date. *See KSR Int'l*, 127 S.Ct. at 1741 (citing with approval *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) ("[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.")); *see also* MPEP §2143 ("The key to supporting any rejection under 35 USC § 103 is the clear articulation of reason(s) why the claimed invention would have been obvious."), and *Ortho-McNeil Pharmaceutical* 86 USPQ at 1201-2 ("a flexible TSM test *remains* the primary guarantee against a non-statutory hindsight analysis (emphasis added).).

In addition, claim 13 recites a molar ratio of (meth)acrylic acid to alkoxyated glycerol in step a) of at least 15:1. The '617 patent absolutely fails to teach, suggest, or even consider such a mole excess of (meth)acrylic acid in the reaction mixture, as stated above. In contrast, the '617 patent, at column 4, line 63 through column 5, line 1 specifically teaches that a molar excess of (meth)acrylic acid *should be* avoided. This alone demonstrates the nonobviousness of claim 13 over the '617 patent, and provides an additional reason why the rejection should be withdrawn.

#### 4. Response to Examiner Arguments in Advisory Action

In the Advisory Action mailed February 2, 2008, the examiner makes several statements in an attempt to support his rejections. These statements either are incorrect and/or strain credulity, even giving pending claims the broadest possible interpretation.

The examiner states the following in the Advisory Action, with reference number added for ease in discussing these various statements:

"(1) Regarding "postcrosslinking", Barthold et al. (col. 7, line 37-50; col. 15, line 41-54) clearly teach a postcrosslinking process. (2) Regarding "drying", Barthold et al. (col. 8, line 55-61; col. 15, line 55-65) clearly disclose a method of rapid removal of water (drying). (3) Regarding applicants' argument that Barthold et al. only teach blanketing with nitrogen, however, applicants fail to recognize that the method disclosed in Barthold et al. still involve passing an inert gas on or over the reactants, which can also function to strip solvents. (4) Regarding the argued "oxygen containing gas", applicants must recognize that the recitation does not specify the location of the oxygen in the gas. Since the polymerization mixture contain methacrylic acid (an oxygen containing compound) that can be stripped or purged by the disclosed nitrogen gas, the examiner has a reasonable basis to believe that the nitrogen gas of Barthold et al. contain an oxygen containing compound (methacrylic acid). (5) Regarding the molar excess of methacrylic acid to alkoxylated glycol of 3.15:1, Barthod [sic] et al. (col 4, line 65) clearly disclose that the methacrylic acid to glycol ranges from 1:1 to 3:1 for n=3. Since Barthold et al. (col. 4, line 67 to col. Col. 5, line 1) clearly indicate that it is not desirable to have gelling occurred, it would not be difficult to one of ordinary skill in the art to recognize and to use an excessive amount of methacrylic acid to prevent the gelling caused by the multifunctional alcohol. Therefore, in view of the reasons set forth above, the rejection of claims 1, 4-7, 10-16, 18, 21, 23, 26, 27, 29, 30, and 32-34 is maintained."

(1) Postcrosslinking process – Addressed in Section IX.F.3., below.

(2) Drying step – Addressed in Section IX.F.3., below.

(3) Nitrogen-blanket – Appellants have clearly differentiated "a blanket" from "stripping" in Section IX.E.3., above. Furthermore, the '617 patent only teaches a nitrogen blanket during the polymerization to keep oxygen out of the reaction mixture. As the examiner states, the '617 patent teaches an "inert gas". The present stripping step is performed *after* the polymerization and utilizes an *active* oxygen-containing gas.

Furthermore, why would a person skilled in the art strip a solvent from a reaction the entire time the reaction is proceeding? The solvent is present to facilitate the reaction and remains until the reaction is complete.

(4) Oxygen-containing gas – The examiner contends that the term "oxygen-containing gas" is met because the "location of the oxygen in the gas" is not recited. He then states that some (meth)acrylic acid may be purged by the nitrogen blanket, and therefore the gas is oxygen containing.

First, appellants have difficulty in understanding what is meant by where the oxygen is located in the gas. The oxygen is located throughout the gas, for example, as in air.

Second, appellants clearly recite an "oxygen-containing gas", i.e., a gas containing O<sub>2</sub>, such as air or an air-nitrogen mixture as set forth in the specification at page 22, lines 34-36. Appellants have defined "oxygen-containing" as meaning containing air, or an O<sub>2</sub> content, and have clearly claimed the gas as such. Using an oxygen-containing *compound*, as suggested by the examiner, is an unreasonable extension of the meaning of the term "oxygen-containing *gas*". Furthermore, an oxygen-containing compound, e.g., (meth)acrylic acid, would not perform the function desired, i.e., inhibition of premature polymerization. Oxygen (O<sub>2</sub>) performs this function; (meth)acrylic acid will not function as a self inhibitor of polymerization.

Appellants have clearly and definitely recited using a gas containing O<sub>2</sub> in the stripping step.

(5) Molar excess – The '617 patent fails to teach or suggest using an excess amount of (meth)acrylic acid, and discourages such an excess. The '617 patent teaches using 1 mole of acid for a monohydric alcohol, 2 moles of acid for a diol, and 3 moles for a triol ('617 patent, column 4, lines 63-66). The '617 patent then states a "ratio of 1:1 is preferred, since otherwise gelling may be observed during the subsequent polymerization" (column 4, line 67 through column 5, line 1). The '617 patent therefore expressly teaches *avoiding* excess (meth)acrylic acid from a reaction with the alkoxyated alcohol in order to avoid

gelling when the compound is copolymerized with acrylic acid. In *direct contrast*, the present claims recite and require the presence of an excess amount of (meth)acrylic acid.

The examiner totally misreads the '617 patent by stating it using excess (meth)acrylic acid would prevent gelling. The '617 patent expressly states otherwise.

**F. REJECTION OF CLAIMS 14-16, 26, 27, 29, 30, AND 32-34 UNDER 35 U.S.C. §102(b) AS BEING ANTICIPATED BY THE '617 PATENT AND REJECTION OF CLAIMS 26, 27, 29, 30, AND 32-34 UNDER 35 U.S.C. §103 AS BEING OBVIOUS OVER THE '617 PATENT**

Claim 14-16 are directed to a process for preparing a crosslinked hydrogel using a (meth)acrylic ester of polyalkoxylated glycerin of claim 1 (claims 14 and 16) or a compound of structural formula Ia wherein AO can be solely EO or PO (claims 14 and 15). Claims 26, 27, 29, 30, and 32-34 are directed to a crosslinked hydrogel prepared by the method of claim 14 (claims 26, 27, and 32-34) and to articles containing a polymer prepared by the method of claim 14 (claims 29 and 30).

**1. Rejection of Claims 14-16, 26, 27, 29, 30, and 32-34 as Being Anticipated by the '617 Patent**

Each of claims 14, 15 and 16 recite a postcrosslinking step and a drying step. The '617 patent fails to disclose either of these steps, let alone both, and it is imperative that a reference must disclose *each* and *every* claimed feature *in complete* a detail as contained in the claim. See MPEP §2131. Accordingly, differences exist between claims 14-16 and the '617 patent, such that a rejection under 35 U.S.C. §102(b) cannot be maintained.

With respect to claims 26, 27, 29, 30, and 32-34, the '617 patent is silent with respect to the features recited in any of these claims. The '617 patent fails to disclose a crosslinked hydrogel having a saponification index of less than 11 (claim 26), less than 8 (claim 32), or less than 5 (claim 33). The '617 patent also fails to disclose a crosslinked hydrogel having a reduced crosslinker content of less than 10 ppm (claim 27) or less than 5 ppm (claim 34).

It cannot be stated that the hydrogels recited in these claims are inherently anticipated by a polymer of the '617 patent because appellants have demonstrated that the

amount of residual crosslinker and the saponification index change with the identity of the crosslinker. See specification, page 51 and 52, in Tables 1 and 2. The art therefore is unpredictable with respect to the absorption properties of an SAP as they relate to the crosslinking agent used in the preparation of the SAP. To support a contention of inherency, the cited reference must necessarily teach the recited claim element is a necessary feature or result from the disclosure in the reference. The fact that a certain result may occur or be present is insufficient to establish inherency. In addition, the examiner has not provided a basis in fact or technical reasoning to support an assertion that the features of claims 26, 27, 29, 30 and 32-34 necessarily flow from the '617 patent. See MPEP §2112. The '617 patent fails to meet this test, and therefore, cannot anticipate claims 26, 27, 29, 30, and 32-34 based on inherency.

With respect to claim 16, this claim depends from claim 7 and recites additional process steps to prepare a crosslinked hydrogel. Claim 16 therefore is not anticipated under 35 U.S.C. §102(b) for the same reasons that claim 7 is not anticipated by the '617 patent. In addition, the '617 patent fails to teach or suggest *any* of steps k) through n) of claim 16.

The '617 patent teaches a reaction between an alkoxyated alcohol and (meth)acrylic acid to form an oxyalkylated ester monomer ('617 patent, column 10, line 13 through column 11, line 6) and a reaction between the oxyalkylated ester monomer and (meth)acrylic acid ('617 patent, column 11, line 48 through Table 4 of columns 13 and 14). The '617 patent fails to disclose (a) a postcrosslinking step (optional), (b) a drying step (required), or (c) a grinding and/or sieving step (optional). Accordingly, claim 16 recites steps that are not disclosed in the '617 patent, which provides additional reasons why the '617 patent fails to anticipate claim 16 under 35 U.S.C. §102(b).

**2. Rejection of Claims 26, 27, 29, 30, and 32-34 as Being Obvious over the '617 patent.**

Claims 26, 27, 29, 30, and 32-34, which depend from claim 14, stand rejected under 35 U.S.C. §103 as being obvious over the '617 patent. The rationale appears to be that the claims recite a polymer similar to the polymer of the '617 patent, and therefore would have been obvious. Although claims 14-16 do not stand officially rejected under 35 U.S.C.

§103, it is submitted that these claims, like claims 26, 27, 29, 30, and 32-34, would not have been obvious over this reference.

In particular, with respect to claims 14-16, the '617 patent fails to teach a postcrosslinking step or a drying step, and provides no apparent reason for a person skilled in the art to perform such steps. It must be noted that an SAP is postcrosslinked to improve fluid absorption properties. The polymers of the '617 are not SAPs, but oil demulsifiers. The present claims provide a hydrogel designed to absorb and retain large amounts of an aqueous fluid. The polymers of the '617 patent are designed to separate oil from water, not to absorb and retain water. Thus, an improvement of fluid absorption properties is neither considered nor addressed by the '617 patent.

With respect to claims 20, 27, 29, 30, and 32-34, appellants have shown unpredictably in the art in Tables 1 and 2 at pages 51 and 52 of the specification. The data show that absorption properties of a hydrogel are affected by the crosslinking agent. The present polymers are prepared from a polyalkoxylated (meth)acrylate of *glycerol* containing 3, 4, or 5 moles of an alkylene oxide per mole of alcohol. The '617 patent discloses polyalkoxylated (meth)acrylates of an alcohol containing *more* than 5 moles of an alkylene oxide per mole of alcohol. See '617 patent, Table 1, at columns 9 and 10. Therefore, the polyalkoxylated (meth)acrylates of the '617 patent are *different* from the claimed glycerols, and would provide a polymer having absorption properties different from, and inferior to, a claimed hydrogel. See specification, pages 51 and 52.

Such compounds are substantially different from the claimed esters, and polymers crosslinked with a compound similar to those disclosed in the '617 demonstrated inferior absorption properties, as set forth in the examples of the specification. The '617 patent provides no hint or apparent reason to utilize a low mole ratio of alkylene oxide to glycerol, and in fact discourages such a use. The '617 patent is directed to demulsification, i.e., separating oil and water, not to an SAP which is designed to absorb aqueous liquids. The cited reference simply provides no incentive to alter the teachings of the '617 patent, then use a claimed ester to provide a hydrogel, let alone a hydrogel having the absorption properties recited in claims 26, 27, and 32-34.



With respect to article claims 29 and 30, the '617 patent is silent with respect to including a disclosed polymer in any article, but merely teaches use of the polymer as a demulsifier.

In view of the above, appellants submit that claims 14-16, 26, 27, 29, 30, and 32-34 would not have been obvious over the '617 patent.

### **3. Response to Examiner Arguments in Advisory Action**

The examiner's comments in the Advisory Action of February 2, 2008 are set forth above in Section IX.E.4. above. Appellants now address reference numbers (1) and (2) of the examiner's comments.

(1) Postcrosslinking process – The '617 patent at column 7, lines 37-50, teaches that the molecular weight of the polymers can be increased in a subsequent step by additional crosslinking. As taught by the '617 patent, the polymer prepared therein is in *solution* and an additional crosslinking agent is added to react further with the polymer and increase the molecular weight of the polymer. The result is a viscous solution. See '617 patent, column 15, lines 41-45.

The subsequent postcrosslinking of the '617 patent is different from the postcrosslinking recited in the claims. The present postcrosslinking step is disclosed at page 27, line 33 through page 16. A postcrosslinker is added to crosslink only the surfaces of the hydrogel, see specification page 28, lines 2 and 3. The SAP is sprayed to form droplets, a postcrosslinker is applied to the surfaces of the droplets, and the resulting droplets are heated to dry and surface crosslink the SAP *particles*.

It is well known in the art to surface postcrosslink SAP particles as set forth in, "Modern Superabsorbent Polymer Technology," F. Buchholz et al., eds., Wiley-VCH, New York, NY (1998), pages 97-103. It is clear that the term "postcrosslinking", as well-known and used in the art of SAPs, refers to surface crosslinking that improves the absorption properties of the SAP. The additional crosslinking is limited to the surface areas of the SAP particles.

This is substantially different from providing additional crosslinks throughout a polymer in solution to increase the molecular weight of the polymer. If the additional crosslinking step of the '617 patent was performed, the resulting particle would not be a *hydrogel*, as claimed. The excessive amount of crosslinking would not permit the absorption and retention of aqueous fluids required by a hydrogel, e.g., an SAP. The additional crosslinking taught in the '617 patent would therefore destroy the hydrogels of the present invention.

(2) Drying step – The examiner relies upon the '617 patent, column 8, lines 55-61 and column 15, lines 55-65 to support a contention of rapid water removal or drying. The relied upon portions of the '617 patent disclose adding "a demulsifier composition" of the '617 patent (i.e., a polymer) to a crude oil emulsion in order to break the emulsion ('617 patent, column 8, lines 49-54). The crude oil emulsions are "easily separated" into clean oil and brine ('617 patent, column 8, lines 40-48). The '617 patent, at line 15, lines 55-65 demonstrates that the *copolymers* demulsify crude oil, and the amount of water "separated off was recorded".

These portions of the '617 patent again relate to the copolymer of an oxyalkylated monomer and a hydrophilic monomer, and *use* of the *polymer* to demulsifying crude oil. These portions of the '617 patent do not remotely relate to present claim 16, which is directed to a process for preparing a crosslinked hydrogel.

Furthermore, the '617 patent is not remotely directed to the claimed drying step, it is directed to "separating" water from oil in a crude oil emulsion. Present claim 16 recites "drying" the reaction mixture obtained for step k), i.e., removing the remaining water from the polymer by heating the polymers. See specification, page 28, lines 1-16.

Importantly, it must be further noted that the drying step recited in the claims refers to drying of the crosslinked hydrogel. Should the demulsification of the '617 patent somehow be considered as a drying step, it is the *oil* that is being dried in the '617 patent, not the demulsifying polymer. In contrast to the presently claimed drying step, the polymer of the '617 patent is being *hydrated* by its addition to a water-containing crude oil emulsion.

**G. REJECTION OF CLAIMS 18 AND 21-23 UNDER 35 U.S.C. §102(B) AS BEING ANTICIPATED BY THE '617 PATENT**

Claim 18 is directed to a crosslinked hydrogel crosslinked with an ester of claim 1 or a compound of structural formula Ia wherein AO can be solely EO or PO. Claim 21 is directed a composition comprising (a) an ester of claim 1 or a compound of structural formula Ia wherein AO can be solely EO or PO and (b) at least one hydrophilic monomer. Dependent claim 22 recites that the composition of claim 1 further comprises a diluent. Claim 23 recites a hydrogel prepared from the composition of claim 21 and optionally postcrosslinked.

**1. Rejection of Claims 18 and 21-23 as Being Anticipated by the '617 Patent**

With respect to ester F of claims 18 and 21, the '617 patent specifically discloses a ratio of alcohol to alkoxides or from 1:120 to 1:5. See '617 patent at column 3, lines 64 and 65. Claims 18 and 21 recite a sum of  $p1 + p2 + p3$  is 3 or 4. Accordingly, a difference exists between the '617 patent and present claims 18 and 21-23 such that a rejection under 35 U.S.C. §102(b) cannot be maintained.

Furthermore, the '617 patent fails to teach the claimed ester component with sufficient specificity to serve as an anticipating reference for the same reasons claim 1 is patentable over EP '287. See Sections IX.B and D., and incorporated herein. The '617 reference teaches a broad range of esters, but does not allow a person skilled in the art to clearly envision the claimed esters. The '617 patent examples fail to disclose any alkoxylated glycerol, and in each example the total number of moles of alkoxylate is far greater than the claimed number of moles of EO and PO, i.e., 3 or 4.

In view of the above, appellants submit that claims 18 and 21-23 are not anticipated by the '617 patent and that the rejection should be withdrawn.

**2. Nonobviousness of Claims 18 and 21-23**

Although claims 18 and 21-23 were not officially rejected as being obvious over the '617 patent, the above described differences between these claims and the '617 patent are nonobvious differences. The '617 patent generally teaches monofunctional and

multifunctional alcohols at column 3, lines 36-53. Glycerol is disclosed among more than specific 20 alcohols. The '617 patent also discloses 15 alkoxyated alcohols at Table 1 of the reference. No disclosed alkoxyated alcohol in the examples is glycerin, and the ratio of alcohol to alkylene oxide is far above the ratio of 1 to 3 and 1 to 4 recited in claims 18 and 21, e.g., Example a3 of the '617 patent has a ratio of 1 to about 49, Example a4 has a ratio of 1 to about 36. Example a5 has a ratio of 1 to about 66, and Example a6 is 1 to about 40.

The specific teachings of the '617 patent therefore are directed to alkoxyated alcohols containing a high amount of alkylene oxide in order to perform their intended function of demulsifying a crude oil emulsifier. Persons skilled in the art, after reading the '617 patent, would have had no apparent reason to select glycerin from the long list of disclosed alcohols, then alkoxyate with only 3 or 4 ethylene oxide and/or propylene oxide units. Accordingly, it is submitted that claims 18 and 21-23 would not have been obvious to a person of ordinary skill in the art in view of the '617 patent.

With respect to the examiner's contentions regarding the term "diluent" in claim 22, claim 10 of the '617 patent refers to an oil/water mixture to which the *copolymer* is added to *effect* demulsification. The "crude oil and water mixture" is *not* present in the composition prior to polymerization as recited in claim 22, but a polymer is added to the crude oil emulsion after polymerization. See '617 patent, column 8, lines 40-61. Claim 22 further recites that the diluent is water and/or a water-soluble organic solvent, as opposed to crude oil.

With respect to the examiner's comments regarding the '617 patent at column 1, lines 52-62, this portion of the '617 specification is directed to *prior* resins that demonstrates *disadvantages*, such as gelling. The '617 patent disclosure is not directed to the resins disclosed at column 1, lines 52-62, but to resins that may overcome these disadvantages. The '617 patent therefore is directed to resins that do *not* gel, in contrast to the presently claimed SAPs.

In view of the foregoing, substantial differences exist between the '617 patent and claims 18 and 21-23, and these claims would not have been obvious over the '617 patent under 35 U.S.C. §103.

**X. CONCLUSION**

In view of the foregoing remarks, appellants respectfully request that the Board reverse the final rejection of claims 1, 4-7, 10-16, 18, 21-23, 27, 29, 30, and 32-34, and that all pending claims should be allowed.

Dated: May 15, 2008

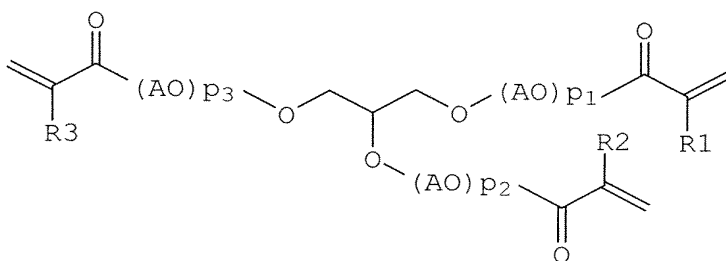
Respectfully submitted,

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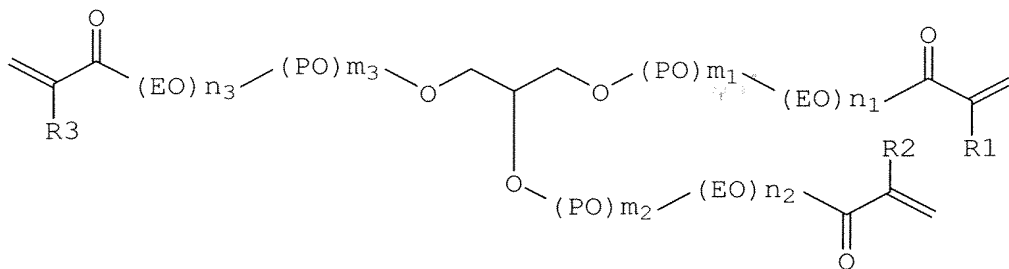
**CLAIMS APPENDIX****Claims on Appeal in Application Serial No. 10/516,702**

1. (Previously presented) An ester F of formula Ia



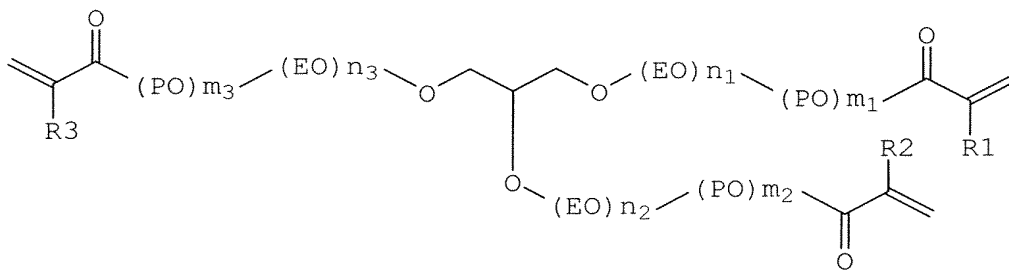
Ia

or formula Ib



Ib

or formula Ic



Ic

wherein AO is for each AO independently EO or PO,

EO is O-CH<sub>2</sub>-CH<sub>2</sub>-,

PO is at each instance independently O-CH<sub>2</sub>-CH(CH<sub>3</sub>)- or O-CH(CH<sub>3</sub>)-CH<sub>2</sub>-

a sum of m<sub>1</sub> + m<sub>2</sub> + m<sub>3</sub> + n<sub>1</sub> + n<sub>2</sub> + n<sub>3</sub> is 3, 4, or 5,

a sum of m<sub>1</sub> + m<sub>2</sub> + m<sub>3</sub> is 1, 2, 3, or 4,

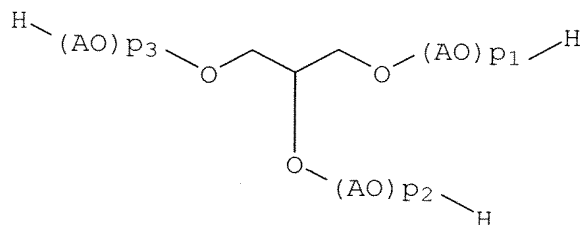
a sum of  $p_1 + p_2 + p_3$  is 3, 4, or 5, and  
R1, R2, and R3 are independently H or CH<sub>3</sub>,  
wherein at least one AO is PO and at least one further AO is EO.

4. (Previously presented) The ester F of claim 1 wherein the sum of  $m_1 + m_2 + m_3 + n_1 + n_2 + n_3$  or  $p_1 + p_2 + p_3$  is equal to 3 or 5.

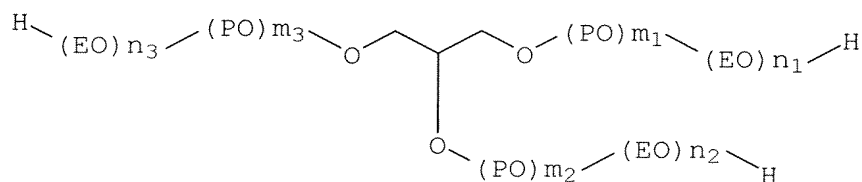
5. (Previously presented) The ester F of claim 1 wherein 3 POs are present in total.

6. (Previously presented) The ester F of claim 1 wherein at least one PO is present in each of the 3 alkoxy chains of glycerol.

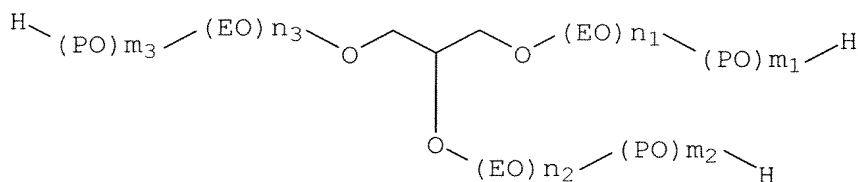
7. (Previously presented) A process for preparing an ester F of claim 1 from an alkoxyated glycerol of the formula IIa, IIb, or IIc



IIa



IIb



IIc

wherein AO, EO, PO, n1, n2, n3, m1, m2, m3, p1, p2, and p3 are each as defined in claim 1,

and (meth)acrylic acid, comprising the steps of

- a) reacting the alkoxyated glycerol with the (meth)acrylic acid in the presence of at least one esterification catalyst C, at least one polymerization inhibitor D, and optionally a water-azeotroping solvent E to form the ester F,
- b) optionally removing from the reaction mixture some or all of the water formed in a), during and/or after a),
- f) optionally neutralizing the reaction mixture,



h) when a solvent E is used, optionally removing the solvent E by distillation, and/or

i) stripping with a an oxygen-containing gas which is inert under the reaction conditions, wherein

a molar excess of (meth)acrylic acid to alkoxyated glycerol is at least 3.15:1 and

the optionally neutralized (meth)acrylic acid present in the reaction mixture after the last process step substantially remains in the reaction mixture.

10. (Previously presented) The process of claim 7 wherein the (meth)acrylic acid is not more than 75% by weight removed from the reaction mixture obtained after the last process step, which reaction mixture contains the ester F.

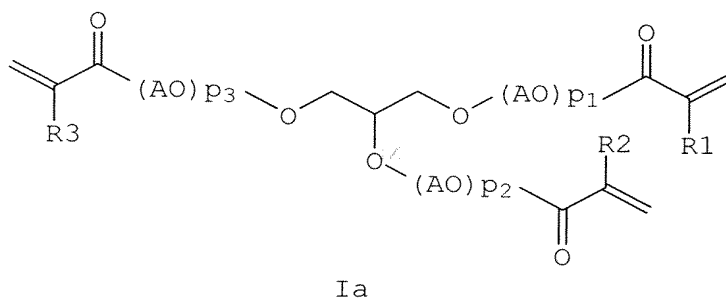
11. (Previously presented) The process of claim 7 wherein the reaction mixture obtained after the last process step, which comprises the ester F, has a DIN EN 3682 acid number of at least 25 mg of KOH/g.

12. (Previously presented) The process of claim 7 wherein the reaction mixture obtained after the last process step, which comprises the ester F, has a (meth)acrylic acid content of at least 0.5% by weight.

13. (Previously presented) The process of claim 7 wherein the molar ratio of (meth)acrylic acid to alkoxyated glycerol in step a) is at least 15:1.

14. (Previously presented) A process for preparing a crosslinked hydrogel, comprising the steps of

- k) polymerizing an ester F of claim 1 or an ester F of the formula Ia



wherein AO is for each AO independently EO or PO,

EO is O-CH<sub>2</sub>-CH<sub>2</sub>-,

PO is at each instance independently O-CH<sub>2</sub>-CH(CH<sub>3</sub>)- or O-CH(CH<sub>3</sub>)-CH<sub>2</sub>-

a sum of p<sub>1</sub> + p<sub>2</sub> + p<sub>3</sub> is 3, 4, or 5,

R<sub>1</sub>, R<sub>2</sub>, and R<sub>3</sub> are independently H or CH<sub>3</sub>,

with (meth)acrylic acid, optionally an additional monoethylenically unsaturated compound N, and optionally one further copolymerizable hydrophilic monomer M, in the presence of at least one free-radical initiator K, and optionally of at least one grafting base L,

- l) postcrosslinking the reaction mixture obtained from k),  
 m) drying the reaction mixture obtained from k) or l), and  
 n) optionally grinding and/or sieving the reaction mixture obtained from k), l), or m).

15. (Previously presented) The process of claim 14 wherein AO is EO.

16. (Previously presented) The process for preparing a crosslinked hydrogel, comprising steps a) to i) of claim 7 and additionally

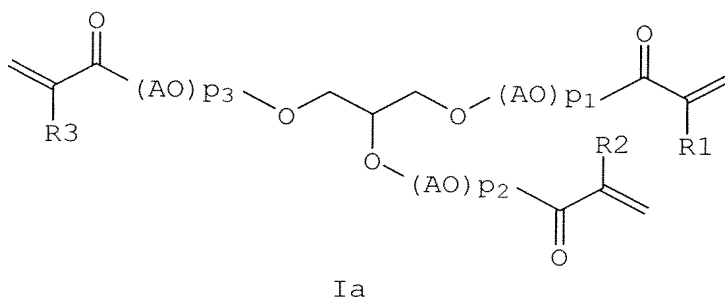
k) polymerizing the reaction mixture from one of stages a) to i) if performed, with an optionally additional monoethylenically unsaturated compound N, and optionally at least one further copolymerizable hydrophilic monomer M, in the presence of at least one free-radical initiator K and optionally at least one grafting base L,

l) optionally postcrosslinking the reaction mixture obtained from k),

m) drying the reaction mixture obtained from k) or l), and

n) optionally grinding and/or sieving the reaction mixture obtained from k), l), or m).

18. (Previously presented) A crosslinked hydrogel comprising at least one hydrophilic monomer M in polymerized form crosslinked with an ester F of claim 1 or an ester F of formula Ia



wherein AO is for each AO independently EO or PO,

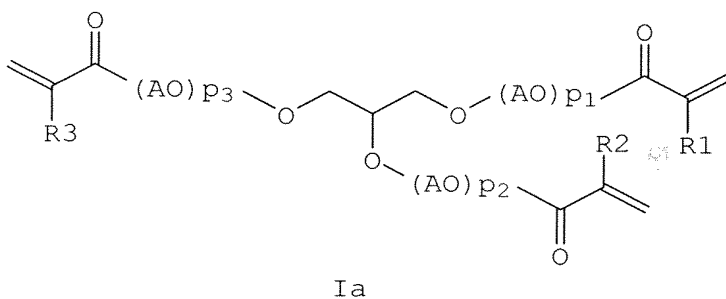
EO is O-CH<sub>2</sub>-CH<sub>2</sub>-,

PO is at least instance independently O-CH<sub>2</sub>-CH(CH<sub>3</sub>)- or O-CH(CH<sub>3</sub>)-CH<sub>2</sub>-

a sum of p<sub>1</sub> + p<sub>2</sub> + p<sub>3</sub> is 3 or 4

R<sub>1</sub>, R<sub>2</sub>, and R<sub>3</sub> are independently H or CH<sub>3</sub>.

21. (Previously presented) A composition comprising from 0.1% to 40% by weight of at least one ester F of claim 1 or an ester F of formula Ia



wherein AO is for each AO independently EO or PO,

EO is O-CH<sub>2</sub>-CH<sub>2</sub>-

a sum of p<sub>1</sub> + p<sub>2</sub> + p<sub>3</sub> is 3 or 4,

R<sub>1</sub>, R<sub>2</sub>, and R<sub>3</sub> are independently H or CH<sub>3</sub>,

and (meth)acrylic acid,

0.5-99.9% by weight of at least one hydrophilic monomer M,

0-10% by weight of at least one esterification catalyst C,

0-5% by weight of at least one polymerization inhibitor D, and

0-10% by weight of a solvent E,

with the proviso that the sum total is always 100% by weight.

22. (Previously presented) The composition of claim 21 further comprising a diluent G, said diluent selected from the group consisting of water, a mixture of water and one or more organic solvent that is soluble in water in any proportion, and a mixture of water and one or more monohydric and/or polyhydric alcohol.

23. (Previously presented) A crosslinked hydrogel prepared from a composition of claim 21 and optionally postcrosslinked.

26. (Previously presented) A crosslinked hydrogel of claim 14 having a saponification index of less than 11.

27. (Previously presented) A crosslinked hydrogel of claim 14 having a residual crosslinker content of less than 10 ppm.

29. (Previously presented) An article comprising a polymer prepared according to the method of claim 14.

30. (Previously presented) The article of claim 29 selected from the group consisting of a hygiene article, a packaging material, and a nonwoven.

32. (Previously presented) The crosslinked hydrogel of claim 26 having a saponification index of less than 8.

33. (Previously presented) The crosslinked hydrogel of claim 26 having a saponification index of less than 5.

34. (Previously presented) The crosslinked hydrogel of claim 27 having a residual crosslinker content of less than 5 ppm.

**EVIDENCE APPENDIX**

"Hawley's Condensed Chemical Dictionary, Thirteenth Ed." (1997), page 1052. (submitted with Amendment "A" on August 1, 2007)

"Modern Superabsorbent Polymer Technology", F. Buchholz et al., eds., Wiley-VCH, New York, NY (1997), pages 39-44. (submitted with Amendment "A" on August 1, 2007)

**RELATED PROCEEDINGS APPENDIX**

There are no related proceedings.

Docket No.: 29827/40663  
(PATENT)

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

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In re Patent Application of:  
Andreas A. Popp et al.

Application No.: 10/516,702

Confirmation No.: 6743

Filed: December 2, 2004

Art Unit: 1796

For: (Meth)Acrylic Esters of Polyalkoxylated Glycerine

Examiner: Wililam K. Cheung

**APPEAL BRIEF**

MS Appeal Brief - Patents  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

This Appeal Brief is submitted in triplicate to support the Notice of Appeal, filed in this application on March 12, 2008. This Appeal Brief is accompanied by the fee for filing an Appeal Brief under 37 C.F.R. §1.17(b) and a one-month extension of time under 37 C.F.R. §1.136(a). Accordingly, this Appeal Brief is timely filed and no further fees and believed due.

Any additional required fee may be charged, or any overpayment credited, to Deposit Account No. 13-2855.



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**III. REAL PARTY IN INTEREST**

The real party in interest in this appeal is BASF Aktiengesellschaft (BASF), Ludwigshafen, Germany, the assignee of the entire right, title, and interest to the above-identified patent application. The assignment was recorded in the United States Patent and Trademark Office ("USPTO") at Reel 16550, Frame 0462 on May 11, 2005, which constitutes the entire chain of title from the inventors to BASF.

**IV. RELATED APPEALS AND INTERFERENCES**

There are no related appeals or interferences known to appellants, appellants' legal representative, or the assignee which will directly affect or be directly affected by, or have a bearing on, the Board's decision in the pending appeal.

**V. STATUS OF CLAIMS**

**A. HISTORY**

This application was originally filed with claims 1-28. Claims 29-34 were added to the application in a preliminary amendment.

**B. CURRENT STATUS OF CLAIMS**

Claims cancelled: 2, 3, 8, 9, 17, 19, 20, 24, 25, 28, and 31.

Claims withdrawn from consideration but not cancelled: None.

Claims pending: 1, 4-7, 10-16, 18, 21-23, 26, 27, 29, 30, and 32-34.

Claims allowed: None.

Claims rejected: 1, 4-7, 10-16, 18, 21-23, 26, 27, 29, 30, and 32-34.

**C. CLAIMS ON APPEAL**

The claims on appeal are claims 1, 4-7, 10-16, 18, 21-23, 26, 27, 29, 30, and 32-34.

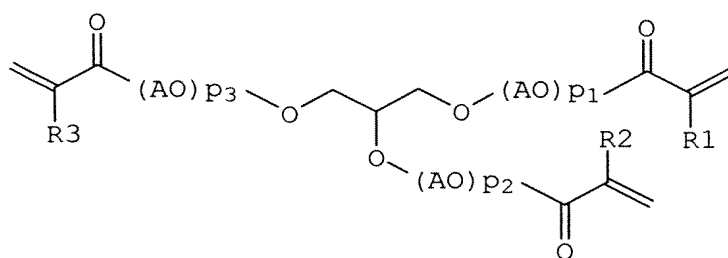
**VI. STATUS OF AMENDMENTS**

Appellants filed an after-final amendment on January 25, 2008. The amendment was not entered, as indicated in the Advisory Action mailed February 2, 2008. Accordingly, appellants understand that the current form of the claims are represented by Amendment "A", filed August 1, 2007, and as reproduced in the Claims Appendix below.

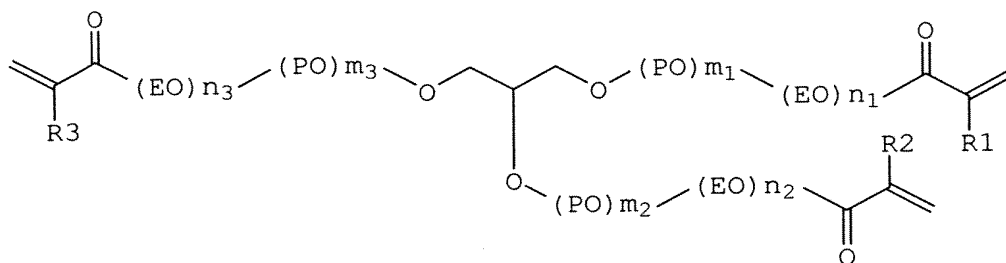
## VII. SUMMARY OF CLAIMED SUBJECT MATTER

The claimed subject matter relates to (meth)acrylic esters of polyalkoxylated glycerol (claims 1 and 4-6), a process for preparing the (meth)acrylic esters (claims 7 and 10-13), a process for preparing a crosslinked hydrogel using the (meth)acrylic esters (claims 14-16), a composition for preparing a crosslinked hydrogel (claims 21 and 22), a crosslinked hydrogel prepared from the (meth)acrylic esters (claims 18, 23, 26, 27, and 32-34), and articles comprising the crosslinked hydrogel (claims 29 and 30). Application specification, page 5, lines 5-26; page 7, lines 22-33; page 8, lines 17-31; and page 33, lines 17 and 18. The inventors have found that improved liquid absorbency properties are exhibited by hydrogels when a claimed (meth)acrylic ester of polyalkoxylated glycerol is used as a crosslinking agent. Specification, page 51, Tables 1 and 2.

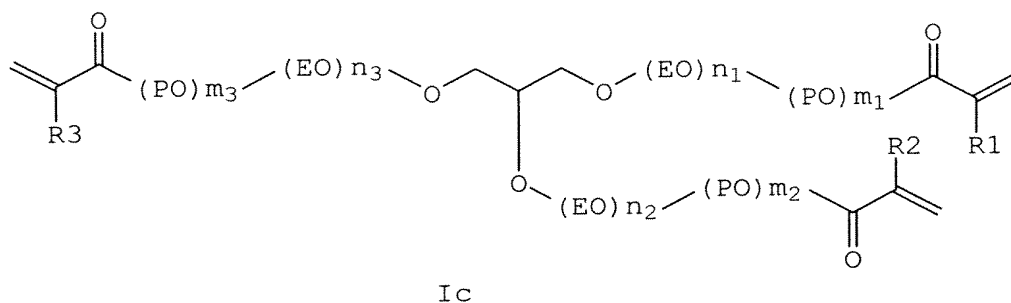
The recited (meth)acrylic esters of claim 1 contain a glycerol base, wherein each hydroxy group of the glycerol is alkoxylated with ethoxy *and* propoxy groups in *each* of the three alkylene oxide chains. The recited (meth)acrylic esters of claim 1 have the following structures Ia, Ib, and Ic:



Ia



Ib



wherein AO is for each AO independently EO or PO,

EO is O-CH<sub>2</sub>-CH<sub>2</sub>,

PO is at each instance independently O-CH<sub>2</sub>-CH(CH<sub>3</sub>)- or O-CH(CH<sub>3</sub>)-CH<sub>2</sub>-

a sum of m<sub>1</sub> + m<sub>2</sub> + m<sub>3</sub> + n<sub>1</sub> + n<sub>2</sub> + n<sub>3</sub> is 3, 4, or 5,

a sum of m<sub>1</sub> + m<sub>2</sub> + m<sub>3</sub> is 1, 2, 3, or 4,

a sum of p<sub>1</sub> + p<sub>2</sub> + p<sub>3</sub> is 3, 4, or 5, and

R<sub>1</sub>, R<sub>2</sub>, and R<sub>3</sub> are independently H or CH<sub>3</sub>,

wherein at least one AO is PO and at least one further AO is EO.

Specification, page 5, line 10 through page 7, line 2.

The total number of alkoxy groups in (meth)acrylic esters Ia, Ib, and Ic is 3, 4, or 5. Specification, page 5, line 10 through page 7, line 2. Specific numbers of alkoxy groups and specific identities of alkoxy groups are recited in claims 4-6. Specification, page 7, lines 4-13.

The (meth)acrylic esters of polyalkoxylated glycerol recited in claims 1 and 4-6 are prepared by a simplified process. Specification page 5, lines 5-8. Claim 7 recites the simplified process, as disclosed in the specification at page 7, lines 22-40, wherein an excess molar amount (at least 3.15 to 1) of (meth)acrylic acid is used in the process and remains in the reaction mixture. Claim 13 recites that this excess molar amount of (meth)acrylic acid is at least 15:1 (specification page 8, lines 12-13 and page 23, lines 6-9).

Claim 10 recites that the (meth)acrylic acid is not more than 75% by weight removed from the reaction mixture obtained after the last process step (specification, page 23, lines 19-20), and claim 11 recites that the reaction mixture after the last process step has an acid number of at least 25 mg of KOH/g (specification, page 23, lines 32-34). Claim 12

recites that the reaction mixture, after the last step, has a (meth)acrylic acid content of at least 0.5%, by weight.

The claims also are directed to a process for preparing a crosslinked hydrogel using a (meth)acrylic ester of claim 1 or an ester formula Ia, wherein an alkoxy chain can be solely ethoxy or solely propoxy, as crosslinking agents for (meth)acrylic acid (claim 14). Specification, page 25, lines 21-30; page 28, line 19; and page 32, line 6-13. Claim 15 recites that AO of compound Ia of claim 14 is EO. Specification, page 5, line 28. Claim 16 recites additional process steps for preparation of a crosslinked hydrogel after performing the process of claim 7. Specification page 25, lines 21-30, page 28, lines 1-9, and page 32, lines 6-13.

Claim 26 recites a crosslinked hydrogel prepared by the process of claim 14 and having a saponification index of less than 11. Specification, page 33, lines 1-5 and page 51, Table 2. Claim 27 recites a crosslinked hydrogel prepared by the process of claim 14 and having an residual crosslinker content of less than 10 ppm. Specification, page 33, lines 7-12 and page 51, Table 2. Claims 32-34 recite crosslinked hydrogels having a saponification index of less than 8, or less than 5 (specification, page 33, lines 1-5), or a residual crosslinker content of less than 5 ppm (specification, page 33, lines 7-12).

Claim 18 recites a crosslinked hydrogel comprising a hydrophilic monomer in polymerized form crosslinked with a (meth)acrylic ester of claim 1 or an ester of formula Ia wherein an alkoxy chain can be solely ethoxy or solely propoxy and the total number of alkoxy groups is 3 or 4. The crosslinked hydrogel is prepared using a composition of claim 21. Specification, page 24, line 27-page 25, line 4. Claim 22 recites that the composition of claim 21 further comprises a diluent G. Specification, page 25, lines 3 and 4, and page 28, lines 23-25. Claim 23 recites a crosslinked hydrogel, optionally postcrosslinked, prepared from a composition of claim 21. Specification, page 27, lines 33-35.

Claims 29 and 30 recite an article comprising a polymer prepared by the method of claim 14, wherein the article can be a hygiene article, a packaging material, or a monomer. Specification, page 33, lines 17 and 18, and page 34, lines 32-33.



**VIII. GROUND OF REJECTION TO BE REVIEWED ON APPEAL**

Whether claims 1 and 4-6 are anticipated under 35 U.S.C. §102(b) by Matsui et al. EP 0 777 287 (EP '287).

Whether claims 7 and 10 are anticipated under 35 U.S.C. §102(b) by Barthold et al. U.S. Patent No. 5,472,617 ('617).

Whether claims 11-13 would have been obvious under 35 U.S.C. §103 over the '617 patent.

Whether claims 14-16 are anticipated under 35 U.S.C. §102(b) by the '617 patent.

Whether claims 18 and 21-23 are anticipated under 35 U.S.C. §102(b) by the '617 patent.

Whether claims 26, 27, 29, 30, and 32-34 are anticipated under 35 U.S.C. §102 by, or alternatively, would have been obvious under 35 U.S.C. §103 over, the '617 patent.

For purposes of the issues on appeal, claims 4-6 are grouped and argued with claim 1.

Claims 10-13 are grouped with claim 7 to form a second group that is separately argued.

Claims 15, 26, 27, 29, 30, and 32-34 are grouped with claim 14 and claim 16 to form a third group that is separately argued.

Claims 18 and 21-23 form a fourth group that is separately argued.

**IX. ARGUMENT****A. INTRODUCTION**

Appellants submit that the rejections issued in the final Office Action are in error, and that the present application is in condition for allowance. Appellants respectfully request the Board to review and reverse each of the rejections issued in the final Office Action.

**B. PROPER BASIS FOR A §102(B) ANTICIPATION REJECTION**

"Anticipation requires a showing that each limitation of a claim is found in a single reference, either expressly or inherently." *Atofina v. Great Lakes Chemical Corp.*, 441 F.3d 991, 999 (Fed. Cir. 2006).

When a claim recites a limitation as a range of numerical values, a reference must describe the range with sufficient specificity to anticipate. *Atofina*, 441 F.3d at 999-1000. Disclosed ranges that only slightly overlap a claimed range do not describe the range with sufficient specificity. See *id.* (reversing findings of anticipation on the basis that (1) a disclosed temperature range of 150 to 350°C only slightly overlapped a claimed range of 330 to 450°C, and (2) a disclosed concentration range of 0.001 to 1.0% only slightly overlapped a claimed range of 0.1 to 5.0%); *Ex parte Hayashi*, 2007 WL 1874815, \*5-6 (B.P.A.I. 2007) (Appeal No. 2007-0665) (reversing an anticipation rejection, finding that a disclosed thickness range of about 100 nm to 500 nm, absent any specific examples less than 100 nm, failed to describe a claimed thickness range of less than 100 nm with sufficient specificity). Further, a reference disclosing a range that is very close to (but which does not overlap or touch) the claimed range does not anticipate the claimed range. MPEP §2131.02(II)(8<sup>th</sup> ed., Rev. 6, Sept. 2007) (citing *Titanium Metals Corp. v. Banner*, 778 F.2d 775 (Fed. Cir. 1985)).

The disclosure of a genus in the prior art is not necessarily a disclosure of every specie that is a member of the disclosed genus. *Atofina*, 441 F.3d at 999. In particular, the disclosure of a range does not constitute a specific disclosure of the endpoints of that range. See *id.* at 1000 (noting that a disclosed range of 150 to 350°C was neither a disclosure of 150°C nor 350°C); see also *Hayashi* at \*6 (finding it irrelevant that the lower limit of "about 100 nm" or the disclosed thickness range could be interpreted to include thicknesses

within the recited range of "less than 100 nm"); *Ex parte Hayes*, 2007 WL 49708, \*9 (B.P.A.I. 2007) (Appeal No. 2006-0990) (noting that end points of a disclosed range do not reflect "data points" for anticipation determination).

With further respect to a rejection under 35 U.S.C. §102(b), MPEP §2131 states:

**"TO ANTICIPATE A CLAIM, THE REFERENCE MUST TEACH EVERY ELEMENT OF THE CLAIM"**

'A claim is anticipated only if each and every elements as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.' *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987)...'The identical invention must be shown in as complete detail as is contained in the...claim.' *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). The elements must be arranged as required by the claim, but this is not an *ipsissimis verbis* test, i.e., identity of terminology is not required. In *re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990)."

In addition, MPEP §2131.03 II. states:

**"PRIOR ART WHICH TEACHES A RANGE WITHIN, OVERLAPPING, OR TOUCHING THE CLAIMED RANGE ANTICIPATES IF THE PRIOR ART RANGE DISCLOSES THE CLAIMED RANGE WITH "SUFFICIENT SPECIFICITY"**

When the prior art discloses a range which touches, overlaps or is within the claimed range, but no specific examples falling within the claimed range are disclosed, a case by case determination must be made as to anticipation. In order to anticipate the claims, the claimed subject matter must be disclosed in the reference with "sufficient specificity to constitute an anticipation under the statute." What constitutes a "sufficient specificity" is fact dependent. If the claims are directed to a narrow range, the reference teaches a broad range, depending on the other facts of the case, it may be reasonable to conclude that the narrow range is not disclosed with "sufficient specificity" to constitute an anticipation of the claims. The unexpected results may also render the claims unobvious. The question of "sufficient specificity" is similar to that of "clearly envisaging" a species from a generic teaching. See MPEP § 2131.02. A 35 U.S.C. 102/ 103 combination rejection is permitted if it is unclear if the reference teaches the

range with "sufficient specificity." The examiner must, in this case, provide reasons for anticipation as well as a motivational statement regarding obviousness. *Ex parte Lee*, 31 USPQ2d 1105 (Bd. Pat. App. & Inter. 1993) (expanded Board). For a discussion of the obviousness of ranges see MPEP § 2144.05."

Two recent CAFC decisions support the reasoning stated in MPEP §2131.03

II. In *Eli Lilly & Co. v. Zenith Goldline Pharm. Inc.*, 81 U.S.P.Q. 2d, 1324 (Fed. Cir. 2006), the court stated that for a reference to anticipate a claim, the reference must *expressly* spell out a definite and limited class of compounds that enable a person skilled in the art to at once envisage each member of this limited class.

In *Impax Labs, Inc. v. Aventis Pharma Inc.*, 468 F.3d 1366 (Fed Circ. 2006), the court stated that the prior art patent disclosed such a large number of compounds that one of ordinary skill in the art would not have recognized that the claimed compound was useful to treat a disease without additional details or guidance, which was not found in the prior art patent.

Also see *In re Petering and Fall*, 133 USPQ 275, 299 (C.C.P.A. 1962), cited in *Impax Labs*, wherein the court stated:

"Next we consider the legal effect of the generic and specific descriptions of isoalloxazine structures in the Karrer patent. The generic formula of Karrer, "wherein X, Y, Z, P, and R' represent either hydrogen or alkyl radicals, R a side chain containing an OH group," encompasses a vast number and perhaps even an infinite number of compounds since there is no express limit on the size of the alkyl group or the structure and size of R. Even though appellants' claimed compounds are encompassed by this broad generic disclosure, we do not think this disclosure by itself *describes* appellants' invention, as defined by them in any of the appealed claims, within the meaning of 35 U.S.C. 102(b)."

### C. PROPER BASIS FOR A §103(a) OBVIOUSNESS REJECTION

A determination that a claimed invention would have been obvious under §103(a) is a legal conclusion involving four factual inquiries: (1) the scope and content of the prior art; (2) the differences between the claimed invention and the prior art; (3) the level of ordinary skill in the pertinent art; and (4) secondary considerations, if any, of non-obviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966). Secondary considerations of non-obviousness include factors such as commercial success, long-felt but unresolved needs, the failure of others, and/or *unexpected results achieved by the claimed invention*. *Id.* Obviousness is determined from the vantage point of a hypothetical person having ordinary skill in the art which the claimed subject matter pertains, who is presumed to have all prior art references in the field of the invention available to him/her. *In re Rouffet*, 149 F.3d 1350, 1357 (Fed. Cir. 1998). Furthermore, obviousness must be determined as of the time the invention was made and in view of the state of the art that existed at that time. *Uniroyal Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 1050-51 (Fed. Cir. 1988).

The Patent Office must clearly articulate facts and reasons why the claimed invention "as a whole" would have been obvious to a hypothetical person having ordinary skill in the art at least as of the claimed invention's effective filing date. *KSR Int'l Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1741 (2007) (citing with approval *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) ("[R]jections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.")); see also MPEP §2143 ("The key to supporting any rejection under 35 U.S.C. §103 is the clear articulation of reason(s) why the claimed invention would have been obvious.").

To reach a proper determination under 35 U.S.C. §103(a), the examiner must step backward in time and into the shoes worn by the hypothetical "person of ordinary skill in the art" when the invention was unknown and just before it was made. In view of all factual information, the examiner must then make a determination whether the claimed invention "as a whole" would have been obvious at that time to that person. Knowledge of applicants' disclosure must be put aside in reaching this determination, yet kept in mind in

order to determine the "differences," conduct the search, and evaluate the "subject matter as a whole" of the invention. The tendency to resort to "hindsight" based upon applicants' disclosure is often difficult to avoid due to the very nature of the examination process. However, impermissible hindsight must be avoided and the legal conclusion must be reached on the basis of the *facts* gleaned from the prior art. MPEP §2142.

Furthermore, to establish a *prima facie* case of obviousness, the examiner must satisfy three requirements. First, as the U.S. Supreme Court very recently held in *KSR International Co. v. Teleflex Inc. et al.*, 127 S.Ct. 1727 (2007), "a court must ask whether the improvement is more than the predictable use of prior art elements according to their established functions. ...it [may] be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was *an apparent reason* to combine the known elements in the fashion claimed by the patent at issue. ...it can be important to *identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements* in the way the claimed new invention does... because inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known." (emphasis added, *KSR, supra*). Second, the proposed modification of the prior art must have had a reasonable expectation of success, determined from the vantage point of the skilled artisan at the time the invention was made. *Amgen Inc. v. Chugai Pharm. Co.*, 18 USPQ2d 1016, 1023 (Fed. Cir. 1991). Lastly, the prior art references must teach or suggest all the limitations of the claims. *In re Wilson*, 165 USPQ 494, 496 (C.C.P.A. 1970).

As recently articulated by the Court of Appeals for the Federal Circuit in *Ortho-McNeil Pharmaceutical Inc. v. Mylan Laboratories Inc.*, 86 USPQ 2d, 1196, 1201-2 (Fed. Cir. 2008):

"As this court has explained, however, a flexible TSM test remains the primary guarantee against a non-statutory hindsight analysis such as occurred in this case. *In re Translogic Tech., Inc.* 504 F.3d 1249, 1257 [84 USPQ 2d 1929] (Fed. Cir. 2007) ("[A]s the Supreme Court suggests, a flexible

approach to the TSM test prevents hindsight and focuses on evidence before the time of invention.)."

Once the Patent Office properly sets forth a prima facie case of obviousness, the burden shifts to the applicants to come forward with evidence and/or argument supporting patentability. *See In re Glaug*, 283 F.3d 1335, 1338 (Fed. Cir. 2002). Rebuttal evidence is merely a showing of facts supporting the opposite conclusion." *In re Piasecki*, 745 F.2d 1468, 1472 (Fed. Cir. 1984). Evidence rebutting a prima facie case of obviousness can include: (a) "evidence of unexpected results," *Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348 1369 (Fed. Cir. 2007); (b) "evidence that the prior art teaches away from the claimed invention in any material respect," *In re Peterson*, 315 F.3d 1325, 1331 (Fed. Cir. 2003); and, (c) evidence of secondary considerations, such as commercial success or long-felt yet unmet needs, *WMS Gaming, Inc. v. International Game Tech.*, 184 F.3d 1339, 1359 (Fed. Cir. 1999). The Patent Office must always consider such evidence supporting patentability. *See, e.g., In re Sullivan*, 498 F.3d 1345, 1352-53 (Fed. Cir. 2007) (reversing a Patent Office decision of obviousness because the Patent Office failed to consider the applicants' evidence rebutting a prima facie case of obviousness because the Patent Office failed to consider the applicants' evidence rebutting a prima facie case of obviousness). If the Patent Office determines that such evidence is not compelling or is insufficient, then the Patent Office should specifically set forth the facts and reasoning supporting that determination. MPEP §2145 (8<sup>th</sup> Ed., Rev. 6, Sept. 2007).

**D. REJECTION OF CLAIMS 1 AND 4-6 UNDER 35 U.S.C. §102(B) AS BEING ANTICIPATED BY MATSUI ET AL. EP PATENT NO. 0 777 287**

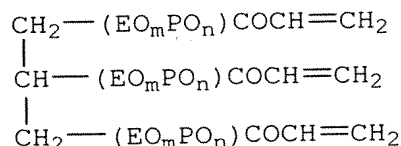
Compound claims 1 and 4-6, directed to (meth)acrylic esters of polyalkoxylated glycerin, stand rejected under 35 U.S.C. §102(b) as being anticipated by EP 0 777 287 (EP '287) based on the assertion that EP '287 discloses the ester F of claim 1.

**1. Disclosure of EP '287**

EP '287 is directed to non-aqueous electrolyte batteries having a negative electrode coated with a polymer film prepared from the compounds disclosed in EP '287. The EP '287 reference fails to teach copolymerization of the disclosed compounds, fails to suggest use of the compounds as a crosslinker for monoethylenically unsaturated monomers,

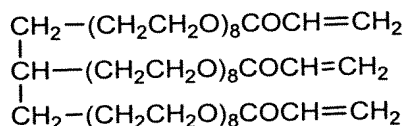
and is in no way related to superabsorbent polymers (SAPs) and a reduction of residual monomers in the production of SAPs.

The EP '287 rejection is based on formula (2), i.e., the *sole* glycerin-based compound of EP '287, having a formula:



wherein m and n do not represent 0 at the same time and  $0 \leq n$  and  $0 \leq m$  (EP '287, page 4, line 32). Accordingly, either EO *or* PO can be absent from the compound, and *no* "upper limit" exists for m, n, or the sum of m+n. EP '287 therefore discloses an infinite number of compounds.

In EP '287, the sole example directed to a glycerin-based compound is Embodiment 4, wherein n=8 and m=0, illustrated as compound (7) at page 8 of EP '287. This compound, having the following formula, is (a) *free* of PO units and (b) contains a sum of 24 EO units.



## 2. Rejection of Claims 1 and 4-6 as Anticipated by EP '287

Claims 1 and 4-6 stand rejected under 35 U.S.C. §102(b) as being anticipated by EP '277. Appellants submit that claims 1 and 4-6 are not anticipated by EP '277 because EP '287 fails to disclose the recited esters with sufficient specificity to anticipate claims 1 and 4-6, as required by *Atofina*.

Claims 1 and 4-6 are directed to an ester F that *requires* the presence of *both* PO *and* EO units in *each* of the three alkylene oxide chains of the claimed glycerin compound. In addition, the total number of EO and PO units in a claimed ester F (not in each alkylene oxide chain) is 3, 4, or 5, as recited. It is submitted, therefore, that even though the



very general, broad teachings of EP '287 may encompass a presently claimed ester F, EP '287 does not anticipate claims 1 and 4-6 under 35 U.S.C. §102(b).

The teachings of EP '287 are to a broad a range of compounds, including both glycerin-based compounds and trimethylolpropane-based compounds. EP '287 discloses an infinite number of compounds because no upper limit is placed on either variable "m" or "n". In addition, either "m" or "n", but not both, can be zero. The reference therefore fails to disclose the genus of compounds therein with any specificity.

The *sole* specific example in EP '287 directed to glycerin-based compounds is compound (7) which contains 24 EO groups and no PO groups, as illustrated above. Accordingly, EP '287 fails to disclose any specific examples encompassed by the claimed compounds, i.e., a glycerin-based compound containing *both* EO and PO groups, wherein the sum of EO and PO is in the claimed narrow range of 3 to 5. All examples in EP '287 contain from 18 to 48 total EO and/or PO units.

As set forth in the MPEP §2131, the present claims are directed to a narrow range within the wide range of the reference, wherein the reference fails to disclose a specific example within the claimed range. It is submitted therefore that EP '287 fails to disclose the claimed subject matter with sufficient specificity to constitute an anticipation under 35 U.S.C. §102(b).

The esters of EP '287 and claimed esters are considerably different, spanning entirely different multiples of total EO and PO units. This level of dissimilarity falls even further below the threshold anticipation requirement of "sufficient specificity" set forth in *Atofina*, where even *slightly overlapping* disclosed and recited ranges were held non-anticipatory. *Atofina*, 441 F.3d at 999-1000; *see also Hayashi* at \*5-6.

Accordingly, EP '287 does not disclose the recited compounds with sufficient specificity and appellants submit that the rejection of claims 1 and 4-6 under 35 U.S.C. §102(b) should be reversed.

### 3. Non-obviousness of Claims 1 and 4-6

EP '287 fails to anticipate claims 1 and 4-6 and EP '287 fails to render claims 1 and 4-6 obvious under 35 U.S.C. §103. In particular, the presently claimed esters exhibit unexpected benefits in the preparation of superabsorbent polymers (SAPs) compared to polyalkoxylated esters similar to those disclosed in EP '287.

The present specification, Table 1 at page 51, includes seven esters (a through g) that are used as crosslinkers in the preparation of an SAP. Examples f and g are comparative because they (a) are based on trimethylolpropane (TMP), (b) contain only EO units, and (c) contain more than a total of 5 EO and PO groups, i.e., Example g. Examples c-e are esters of present claim 1, i.e., based on glycerin, contain EO *and* PO units, and contain a total of up to 5 PO and EO units. Comparative Example g is the most similar example to the EP '287 disclosure, i.e., based on TMP, containing only EO units, and containing 15 EO units. See Embodiment 1 of EP '287, based on TMP and containing 18 EO units and no PO units. The only embodiment of EP '287 based on glycerin contains *only* EO and the total number of EO units is 24.

The data in Table 2 of the specification show that claimed esters c-e provide an SAP having a very low crosslinker residue (over replicate tests) of from less than 5 to 10 ppm. In contrast, a crosslinker based on TMP and containing 15 EO units (i.e., g) provided an SAP having a 20 to 51 ppm crosslinker residue. A comparative crosslinker based on TMP and containing 3 EO units provided an SAP having 857 to 1302 ppm of residual crosslinkers.

In addition, the claimed esters c-e provided SAPs having a VSI value (saponification index) of 7.5 to 9.5. Comparative TMP-based esters f and g demonstrated a VSI value of 36.9 and 11.6, respectively.

The presently claimed esters therefore show unexpected results with respect to crosslinker residue, which ideally is zero to avoid free monomers in the resulting SAP or the need to perform a method step to remove the crosslinker residue. Unexpected results also are demonstrated with respect to VSI values. As stated in the specification, an ideal crosslinker has a VSI of zero because all crosslinking is performed during the reaction, as opposed to

during a drying step. In turn, the properties of the SAP are not altered by the drying process. See specification, page 50, lines 1-6.

In addition, the test data discussed above shows the unpredictability in the art. In particular, either changing from glycerin to TMP, or excluding PO, or containing more than 5 total EO and PO groups, results in crosslinking agents that vary considerably with respect to residual monomers remaining after a polymerization. It is the presently claimed compounds, i.e., based on the glycerin, containing both EO and PO, and 3 to 5 total EO/PO moieties that provided the unexpected results. These results could not have been predicted from the broad disclosure of EP '287.

In view of the broad disclosure of EP '287, including (a) trimethylolpropane and glycerin-based triacrylates, (b) that the disclosed compounds can be free of either EO or PO units, (c) that the number of disclosed compounds is infinite (i.e., one of  $m \leq 0$  and/or  $n \leq 0$ ), (d) that the examples are primarily directed to TMP-based compounds, and (e) that the only glycerin-based example contains 24 EO units only, *and* the unpredictability in the art, *and* the demonstrated unexpected results, it is submitted that EP '287 cannot render claims 1 and 4-6 obvious under 35 U.S.C. §103.

The present claims are closely tailored to be based on glycerin, contain EO *and* PO units, and contain a total *sum* of EO and PO units of 3, 4, or 5, wherein the esters demonstrate unexpected results with respect to performing as a crosslinking agent for an SAP. EP '287 is directed to homopolymers, and the disclosed esters are not used, or even considered, as crosslinking agents. EP '287 also fails to disclose the presently claimed esters with any specificity, and fails to provide any direction, guidance, or apparent reason for a person skilled in the art of SAPs to select the narrow range of claimed compounds from the infinite number of compounds in the reference (which is directed to a non-aqueous electrolyte secondary battery) with any reasonable expectation of providing a crosslinker for SAPs having unexpectedly improved properties over SAPs crosslinked with other esters also broadly disclosed in EP '287 and closer in structure to the examples of EP '287.

For all of the reasons set forth above, appellants submit that claims 1 and 4-6, in addition to being not anticipated by EP '287, would not have been obvious to a person skilled in the art under 35 U.S.C. §103 over EP '287.

#### **4. Response to Examiner Arguments in Advisory Action**

In the Advisory Action mailed February 2, 2008, the examiner states:

"every point disclosed in the range taught by Matsui et al. is adequate for a 102(b) rejection. Regarding unexpected results, applicants must recognize that the submission of unexpected results is not effective in overcoming a 102 based rejection."

The examiner apparently is ignoring case law and the MPEP with respect to 35 U.S.C. §102(b) rejections. For example, in the *Eli Lilly* case discussed above, the court stated that for a reference to anticipate a claim, the reference must expressly spell out a *definite* and *limited* class of compounds that enable a person skilled in the art to at once envisage each member of this limited class. MPEP §2131.03 II also recites "clearly envisaging" a species from a generic teaching. Also see MPEP §2131.02. Also see *Impax Labs* above. Because '287 discloses infinite class of compounds, with no specific example close in structure to the claimed esters, it is submitted that EP '287 cannot anticipate claims 1 and 4-6.

With respect to appellants discussion of unexpected results and the nonobviousness of claim 1 and 4-6, see the discussion in Section IX.B. above, citing MPEP §2131.03 II, which states that "[T]he unexpected results may also render the claim unobvious." Appellants have taken the extra step to demonstrate the nonobviousness of claims 1 and 4-6.

#### **E. REJECTION OF CLAIMS 7 AND 10 UNDER 35 U.S.C. §102(B) AS BEING ANTICIPATED BY BARTHOLD ET AL. U.S. PATENT NO. 5,472,617 ('617) AND REJECTION OF CLAIMS 11-13 UNDER 35 U.S.C. §103 AS BEING OBVIOUS OVER THE '617 PATENT.**

Independent claim 7, and claims 10-13 depending therefrom, are directed to methods of preparing the (meth)acrylate esters of polyalkoxylated glycerin of claim 1. The 102(b) rejection is based on an assertion that the '617 patent purportedly discloses stripping with a gas which is inert under the reaction conditions. The rejection under §103 is based on

an assertion that claimed process is similar to the '617 process, with minimum variations, and that routine experimentation would lead to the claimed process.

### **1. Disclosure of the '617 Patent**

The '617 patent is directed to a method of demulsifying a crude oil and water mixture using copolymers of (meth)acrylic acid and hydrophilic comonomers. The copolymers are prepared by copolymerizing a (meth)acrylate of an alkoxyated alcohol, diol, or triol with a comonomer, e.g., acrylic acid.

The '617 process of preparing an alkoxyated (meth)acrylic ester is disclosed in the Examples, which the examiner relies upon to support the §102(b) and §103 rejections. See '617 patent, column 8, line 65 through column 11, line 6. In this process, an alkoxyated trimethylolpropane (TMP) is mixed with acrylic acid *under a nitrogen atmosphere* and the reaction is allowed to proceed to yield an acrylic ester of alkoxyated TMP (column 10, line 52 through column 11, line 6). The nitrogen atmosphere is applied prior to and maintained during the reaction. After the reaction is complete, the '617 patent teaches that the mixture is cooled, then reacted with acetic anhydride (column 11, lines 2-5).

The '617 patent also disclose that one equivalent of (meth)acrylic acid is used per equivalent of hydroxyl groups in the alkoxyated alcohol. Specifically, the '617 patent, at column 4, line 63 through column 5, line 1 states:

"The ratio of the oxyalkylated alcohol to acrylic acid or methacrylic acid may be varied from 1:1 to 1:n, where n is the functionality (i.e. the number of hydroxyl groups) of the starting alcohol. A ratio of 1:1 is preferred, since otherwise gelling may be observed during the subsequent polymerization."

The '617 patent therefore discourages, and actually teaches away, from using an excess amount of (meth)acrylic acid in the reaction with the alkoxyated alcohol.

### **2. Rejection of Claims 7 and 10 as Anticipated by the '617 Patent**

Claims 7 and 10 stand rejected under 35 U.S.C. §102(b) as being anticipated by Barthold et al. U.S. Patent No. 5,472,617 ('617). The examiner bases this rejection on a assertion that the '617 patent purportedly discloses stripping with a gas which is inert under the reaction conditions.

It is submitted that differences exist between claims 7, 10, and 16 such that a rejection under 35 U.S.C. §102(b) cannot be sustained. The fact that the '617 patent teaches a nitrogen blanket during polymerization, rather than solvent stripping *after* polymerization, is a substantial difference between claim 7 and the '617 patent disclosure. For example, the presently claimed stripping step i) is performed *after* the reaction between the alkoxylated glycol and the (meth)acrylic acid to form the ester F. See specification, page 22, lines 14-20, disclosing a "solvent stripping operation i)". Also see specification, page 21, line 24 through page 22, line 12, further disclosing the solvent removal steps. In contrast, the '617 patent teaches a nitrogen atmosphere over a reaction between an alkoxylated trimethylolpropane (Example a5) and acrylic acid ('617 patent, column 10, lines 41-55), which alone is a difference that precludes a rejection under 35 U.S.C. §102(b).

One major difference between claims 7 and 10 and the '617 patent is that "stripping" is different from a "nitrogen atmosphere". Attached hereto as Exhibit A from *Hawley's Condensed Chemical Dictionary, Thirteen Ed.* (1997), page 1052, is a definition of "stripping" showing that the term refers to the removal of volatile components from a liquid mixture by the passage of a gas through the liquid mixture. Present stripping step i) removes a solvent from the reaction mixture *after* the polymerization.

Another major difference between the '617 patent and claims 7 and 10 is that the stripping is performed using an "oxygen-containing gas", as presently recited in amended claim 7. The teachings of the '617 patent are limited to nitrogen gas. See specification at page 22, lines 4-7 and 34-36, for example. An oxygen-containing gas is utilized in the stripping step to maintain the inhibitory capabilities of a compound like MEHQ during solvent removal, i.e., to inhibit premature polymerization of the formed ester F. It is well-known in the art that oxygen must be present to maintain this polymerization inhibitory capability. See Exhibit B submitted concurrently with this amendment, an excerpt from "Modern Superabsorbent Polymer Technology" (1998), page 39-44, showing the influence of oxygen on polymerization inhibition.

The '617 patent utilizes a nitrogen blanket to help *remove* oxygen from the reaction system, such that the inhibition capabilities of MEHQ are reduced and the polymerization can proceed. The disclosed "nitrogen blanket" is not a stripping function, but,

as well known in the art, is applied over a reaction mixture in the '617 patent to *preclude* the introduction of oxygen into the reaction system. Accordingly, the "nitrogen blanket" of the '617 patent and the "stripping" stages are not identical (e.g., are performed at different steps of the reaction and perform different functions).

In addition, claim 7 also recites a process for preparing an ester F in the presence of a molar excess of (meth)acrylic acid to alkoxyated glycol of at least 3:15:1. The '617 patent fails to teach or suggest a molar excess of at least 3:15:1 of (meth)acrylic acid in the reaction mixture. In contrast, the '617 patent, at column 4, line 63 through column 5, line 1, quoted above, specifically teaches a 1:1 molar ratio (per hydroxyl group of the alcohol) of oxyalkylated alcohol to (meth)acrylic acid, and that an excess of (meth)acrylic acid *should be avoided* or gelling may occur.

With respect to claim 10, the '617 patent teaches that a 1:1 molar ratio of oxyalkylated alcohol to (meth)acrylic acid should be used. Therefore, the resulting reaction product cannot contain an excess amount (meth)acrylic acid. In addition, a step of removing no more than 75% by weight of excess (meth)acrylic acid is neither taught nor suggested in the '617 patent, and cannot be taught because no excess (meth)acrylic acid is present in the reaction mixture. These are additional reasons why the '617 patent fails to anticipate claim 10 under 35 U.S.C. §102(b).

For all the reasons set forth above, appellants submit that the rejection of claims 7 and 10 under 35 U.S.C. §102(b) should be reversed.

**3. Non-Obviousness of Claims 7 and 10 and Rejection of Claims 11-13 under 35 U.S.C. §103 as Being Obvious over the '617 Patent**

Claims 11-13, which depend from claim 7, also stand rejected under 35 U.S.C. §103 as being obvious over the '617 patent. The examiner relies upon a contention of "routine experimentation" to support the rejection. Although not formally rejected under 35 U.S.C. §103, claims 7 and 10 also would not have been obvious over the '617 patent under 35 U.S.C. §103.

In order to support a rejection under 35 U.S.C. §103, the reference must render the invention obvious *as a whole*. In this regard, claim 7 recites a process for preparing an

ester F in the presence of a molar *excess* of (meth)acrylic acid to alkoxyated glycol of at least 3:15:1. In contrast, the '617 patent specifically teaches that a molar excess of (meth)acrylic acid should be *avoided*. See '617 patent, column 4, line 63 through column 5, line 1 (quoted above). The examiner completely ignored the claimed feature of excess (meth)acrylic acid, and as a result has failed to consider the invention as a whole. Also see claim 10, wherein no more than 75% of the excess (meth)acrylic acid is removed from the reaction mixture, and claim 13, which recites a molar excess of (meth)acrylic acid to alkoxyated glycol of *at least 15:1*. It is readily apparent that the '617 patent not only discourages the use of an excess molar amount of (meth)acrylic acid, but actually teaches away from the claimed invention.

With respect to the claimed feature of stripping with a gas, at column 10, line 52 through column 11, line 2, the '617 patent discloses *reacting* an alkoxyated alcohol with acrylic acid "under a nitrogen blanket". This is not equivalent to the stripping step i) recited in claim 7. The difference between a "nitrogen blanket" of the '617 patent and "stripping" with an oxygen-containing gas is discussed above in Section IX.E.2.

A proper *prima facie* case of obviousness *requires* that the prior art reference teach or suggest *all* of the limitation of the claims. The '617 patent fails to teach a "stripping step" *or* using an "oxygen-containing gas". For these reasons alone, a case of *prima facie* obviousness of claims 7 and 10 in view of the '617 patent cannot be sustained.

Furthermore, a person skilled in the art would not substitute a stripping step with an oxygen containing gas for a nitrogen blanket because a nitrogen blanket removes oxygen to facilitate a reaction, whereas an oxygen-containing gas *retards* a premature reaction, or inhibits the reaction. Thus, there is no apparent or common sense reason for such a substitution. The substitution would not accomplish what the prior art teaches, but would *defeat* the desired result.

As stated above, the '617 patent also fails to teach or suggest a mole excess of at least 3:15:1 of (meth)acrylic acid in the reaction mixture. The '617 patent fails to consider or address using such mole excess of (meth)acrylic acid, and provides no apparent reason for a person skilled in the art to use such a molar excess of (meth)acrylic acid. In contrast, the '617 patent, at column 4, line 63 through column 5, line 1, specifically teaches a 1:1 molar



ratio (per hydroxyl group of the alcohol) of oxyalkylated alcohol to (meth)acrylic acid, and that an excess of (meth)acrylic acid should be avoided.

The '617 patent fails to teach every feature of claims 7 and 10, and, in fact, fails to teach more than one feature of these claims. The '617 patent fails to teach or suggest a solvent stripping step, or using an excess molar amount of (meth)acrylic acid, let alone both claimed features, *and* fails to provide any apparent reason for performing such steps. Claims 7 and 10, therefore, would not have been obvious under 35 U.S.C. §103 over the '617 patent.

The examiner also has failed to articulate clear reasons why the presently claimed invention, as a whole, would have been obvious over the '617 patent. Numerous jumps in reasoning would have been required to arrive at the present invention after reading the '617 patent, one of which is expressly taught as being avoided by the '617 patent. The '617 patent therefore does not provide an incentive or apparent reason for a person skilled in the art to modify the '617 patent in a manner needed to arrive at the presently claimed invention. In summary, process claims 7 and 10 are patentable over the cited '617 patent, and the rejection should be withdrawn.

Claims 11-13, which depend from claim 7, stand rejected under 35 U.S.C. §103 as being obvious over the '617 patent. For the reasons set forth above, it is submitted that claims 11-13 also are patentable over the '617 patent for same of the reasons that claims 7 and 10 are patentable over the cited '617 patent.

The totality of the examiner's reasoning supporting this rejection is found at page 6 of the Office Action stating:

"7. Claims 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barthold et al. (US 5,472,617).

Set forth from paragraph 7 of instant office action, the process of Barthold et al. is very similar to the process of claims 11-13.

The difference between the invention of claims 11-13 and Barthold et al. is that Barthold et al. do not disclose minor variations of the process as claimed.

Nevertheless, Barthold et al. (col. 8, line 65 to col. 9, line 40; col. 9, Table 1; col. 11, Table 3) have clearly disclosed a process for preparing the compound ester F as claimed. Therefore, the examiner believes that it would have been obvious to one of ordinary skill in art to use "routine experimentation" technique to optimize the process of Barthold et al. to obtain the invention of claims 11-13. In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955)."

The examiner has totally failed to articulate reasons why claims 11-13 would have been obvious over the '617 patent, except for a conclusory statement relating to "routine experimentation" and "very similar" processes. As stated above in Section IX.C., the Patent Office *must* make it clear in the record with *facts* and *reasoning* that the teaching-suggestion-motivation to modify the reference exists. Regardless of the rationale supporting a conclusion of obviousness the Patent Office must clearly articulate facts and reasons why the claimed invention "as a whole" would have been obvious to a hypothetical person having ordinary skill in the art at least as of the claimed invention's effective filing date. *See KSR Int'l*, 127 S.Ct. at 1741 (citing with approval *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) ("[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.")); *see also* MPEP §2143 ("The key to supporting any rejection under 35 USC § 103 is the clear articulation of reason(s) why the claimed invention would have been obvious."), and *Ortho-McNeil Pharmaceutical* 86 USPQ at 1201-2 ("a flexible TSM test *remains* the primary guarantee against a non-statutory hindsight analysis (emphasis added).).

In addition, claim 13 recites a molar ratio of (meth)acrylic acid to alkoxyated glycerol in step a) of at least 15:1. The '617 patent absolutely fails to teach, suggest, or even consider such a mole excess of (meth)acrylic acid in the reaction mixture, as stated above. In contrast, the '617 patent, at column 4, line 63 through column 5, line 1 specifically teaches that a molar excess of (meth)acrylic acid *should be* avoided. This alone demonstrates the nonobviousness of claim 13 over the '617 patent, and provides an additional reason why the rejection should be withdrawn.

#### 4. Response to Examiner Arguments in Advisory Action

In the Advisory Action mailed February 2, 2008, the examiner makes several statements in an attempt to support his rejections. These statements either are incorrect and/or strain credulity, even giving pending claims the broadest possible interpretation.

The examiner states the following in the Advisory Action, with reference number added for ease in discussing these various statements:

"(1) Regarding "postcrosslinking", Barthold et al. (col. 7, line 37-50; col. 15, line 41-54) clearly teach a postcrosslinking process. (2) Regarding "drying", Barthold et al. (col. 8, line 55-61; col. 15, line 55-65) clearly disclose a method of rapid removal of water (drying). (3) Regarding applicants' argument that Barthold et al. only teach blanketing with nitrogen, however, applicants fail to recognize that the method disclosed in Barthold et al. still involve passing an inert gas on or over the reactants, which can also function to strip solvents. (4) Regarding the argued "oxygen containing gas", applicants must recognize that the recitation does not specify the location of the oxygen in the gas. Since the polymerization mixture contain methacrylic acid (an oxygen containing compound) that can be stripped or purged by the disclosed nitrogen gas, the examiner has a reasonable basis to believe that the nitrogen gas of Barthold et al. contain an oxygen containing compound (methacrylic acid). (5) Regarding the molar excess of methacrylic acid to alkoxyated glycol of 3.15:1, Barthod [sic] et al. (col 4, line 65) clearly disclose that the methacrylic acid to glycol ranges from 1:1 to 3:1 for n=3. Since Barthold et al. (col. 4, line 67 to col. Col. 5, line 1) clearly indicate that it is not desirable to have gelling occurred, it would not be difficult to one of ordinary skill in the art to recognize and to use an excessive amount of methacrylic acid to prevent the gelling caused by the multifunctional alcohol. Therefore, in view of the reasons set forth above, the rejection of claims 1, 4-7, 10-16, 18, 21, 23, 26, 27, 29, 30, and 32-34 is maintained."

(1) Postcrosslinking process – Addressed in Section IX.F.3., below.

(2) Drying step – Addressed in Section IX.F.3., below.

(3) Nitrogen-blanket – Appellants have clearly differentiated "a blanket" from "stripping" in Section IX.E.3., above. Furthermore, the '617 patent only teaches a nitrogen blanket during the polymerization to keep oxygen out of the reaction mixture. As the examiner states, the '617 patent teaches an "inert gas". The present stripping step is performed *after* the polymerization and utilizes an *active* oxygen-containing gas.

Furthermore, why would a person skilled in the art strip a solvent from a reaction the entire time the reaction is proceeding? The solvent is present to facilitate the reaction and remains until the reaction is complete.

(4) Oxygen-containing gas – The examiner contends that the term "oxygen-containing gas" is met because the "location of the oxygen in the gas" is not recited. He then states that some (meth)acrylic acid may be purged by the nitrogen blanket, and therefore the gas is oxygen containing.

First, appellants have difficulty in understanding what is meant by where the oxygen is located in the gas. The oxygen is located throughout the gas, for example, as in air.

Second, appellants clearly recite an "oxygen-containing gas", i.e., a gas containing O<sub>2</sub>, such as air or an air-nitrogen mixture as set forth in the specification at page 22, lines 34-36. Appellants have defined "oxygen-containing" as meaning containing air, or an O<sub>2</sub> content, and have clearly claimed the gas as such. Using an oxygen-containing *compound*, as suggested by the examiner, is an unreasonable extension of the meaning of the term "oxygen-containing *gas*". Furthermore, an oxygen-containing compound, e.g., (meth)acrylic acid, would not perform the function desired, i.e., inhibition of premature polymerization. Oxygen (O<sub>2</sub>) performs this function; (meth)acrylic acid will not function as a self inhibitor of polymerization.

Appellants have clearly and definitely recited using a gas containing O<sub>2</sub> in the stripping step.

(5) Molar excess – The '617 patent fails to teach or suggest using an excess amount of (meth)acrylic acid, and discourages such an excess. The '617 patent teaches using 1 mole of acid for a monohydric alcohol, 2 moles of acid for a diol, and 3 moles for a triol ('617 patent, column 4, lines 63-66). The '617 patent then states a "ratio of 1:1 is preferred, since otherwise gelling may be observed during the subsequent polymerization" (column 4, line 67 through column 5, line 1). The '617 patent therefore expressly teaches *avoiding* excess (meth)acrylic acid from a reaction with the alkoxyated alcohol in order to avoid

gelling when the compound is copolymerized with acrylic acid. In *direct contrast*, the present claims recite and require the presence of an excess amount of (meth)acrylic acid.

The examiner totally misreads the '617 patent by stating it using excess (meth)acrylic acid would prevent gelling. The '617 patent expressly states otherwise.

**F. REJECTION OF CLAIMS 14-16, 26, 27, 29, 30, AND 32-34 UNDER 35 U.S.C. §102(b) AS BEING ANTICIPATED BY THE '617 PATENT AND REJECTION OF CLAIMS 26, 27, 29, 30, AND 32-34 UNDER 35 U.S.C. §103 AS BEING OBVIOUS OVER THE '617 PATENT**

Claim 14-16 are directed to a process for preparing a crosslinked hydrogel using a (meth)acrylic ester of polyalkoxylated glycerin of claim 1 (claims 14 and 16) or a compound of structural formula Ia wherein AO can be solely EO or PO (claims 14 and 15). Claims 26, 27, 29, 30, and 32-34 are directed to a crosslinked hydrogel prepared by the method of claim 14 (claims 26, 27, and 32-34) and to articles containing a polymer prepared by the method of claim 14 (claims 29 and 30).

**1. Rejection of Claims 14-16, 26, 27, 29, 30, and 32-34 as Being Anticipated by the '617 Patent**

Each of claims 14, 15 and 16 recite a postcrosslinking step and a drying step. The '617 patent fails to disclose either of these steps, let alone both, and it is imperative that a reference must disclose *each* and *every* claimed feature *in complete* a detail as contained in the claim. See MPEP §2131. Accordingly, differences exist between claims 14-16 and the '617 patent, such that a rejection under 35 U.S.C. §102(b) cannot be maintained.

With respect to claims 26, 27, 29, 30, and 32-34, the '617 patent is silent with respect to the features recited in any of these claims. The '617 patent fails to disclose a crosslinked hydrogel having a saponification index of less than 11 (claim 26), less than 8 (claim 32), or less than 5 (claim 33). The '617 patent also fails to disclose a crosslinked hydrogel having a reduced crosslinker content of less than 10 ppm (claim 27) or less than 5 ppm (claim 34).

It cannot be stated that the hydrogels recited in these claims are inherently anticipated by a polymer of the '617 patent because appellants have demonstrated that the

amount of residual crosslinker and the saponification index change with the identity of the crosslinker. See specification, page 51 and 52, in Tables 1 and 2. The art therefore is unpredictable with respect to the absorption properties of an SAP as they relate to the crosslinking agent used in the preparation of the SAP. To support a contention of inherency, the cited reference must necessarily teach the recited claim element is a necessary feature or result from the disclosure in the reference. The fact that a certain result may occur or be present is insufficient to establish inherency. In addition, the examiner has not provided a basis in fact or technical reasoning to support an assertion that the features of claims 26, 27, 29, 30 and 32-34 necessarily flow from the '617 patent. See MPEP §2112. The '617 patent fails to meet this test, and therefore, cannot anticipate claims 26, 27, 29, 30, and 32-34 based on inherency.

With respect to claim 16, this claim depends from claim 7 and recites additional process steps to prepare a crosslinked hydrogel. Claim 16 therefore is not anticipated under 35 U.S.C. §102(b) for the same reasons that claim 7 is not anticipated by the '617 patent. In addition, the '617 patent fails to teach or suggest *any* of steps k) through n) of claim 16.

The '617 patent teaches a reaction between an alkoxyated alcohol and (meth)acrylic acid to form an oxyalkylated ester monomer ('617 patent, column 10, line 13 through column 11, line 6) and a reaction between the oxyalkylated ester monomer and (meth)acrylic acid ('617 patent, column 11, line 48 through Table 4 of columns 13 and 14). The '617 patent fails to disclose (a) a postcrosslinking step (optional), (b) a drying step (required), or (c) a grinding and/or sieving step (optional). Accordingly, claim 16 recites steps that are not disclosed in the '617 patent, which provides additional reasons why the '617 patent fails to anticipate claim 16 under 35 U.S.C. §102(b).

**2. Rejection of Claims 26, 27, 29, 30, and 32-34 as Being Obvious over the '617 patent.**

Claims 26, 27, 29, 30, and 32-34, which depend from claim 14, stand rejected under 35 U.S.C. §103 as being obvious over the '617 patent. The rationale appears to be that the claims recite a polymer similar to the polymer of the '617 patent, and therefore would have been obvious. Although claims 14-16 do not stand officially rejected under 35 U.S.C.

§103, it is submitted that these claims, like claims 26, 27, 29, 30, and 32-34, would not have been obvious over this reference.

In particular, with respect to claims 14-16, the '617 patent fails to teach a postcrosslinking step or a drying step, and provides no apparent reason for a person skilled in the art to perform such steps. It must be noted that an SAP is postcrosslinked to improve fluid absorption properties. The polymers of the '617 are not SAPs, but oil demulsifiers. The present claims provide a hydrogel designed to absorb and retain large amounts of an aqueous fluid. The polymers of the '617 patent are designed to separate oil from water, not to absorb and retain water. Thus, an improvement of fluid absorption properties is neither considered nor addressed by the '617 patent.

With respect to claims 20, 27, 29, 30, and 32-34, appellants have shown unpredictably in the art in Tables 1 and 2 at pages 51 and 52 of the specification. The data show that absorption properties of a hydrogel are affected by the crosslinking agent. The present polymers are prepared from a polyalkoxylated (meth)acrylate of *glycerol* containing 3, 4, or 5 moles of an alkylene oxide per mole of alcohol. The '617 patent discloses polyalkoxylated (meth)acrylates of an alcohol containing *more* than 5 moles of an alkylene oxide per mole of alcohol. See '617 patent, Table 1, at columns 9 and 10. Therefore, the polyalkoxylated (meth)acrylates of the '617 patent are *different* from the claimed glycerols, and would provide a polymer having absorption properties different from, and inferior to, a claimed hydrogel. See specification, pages 51 and 52.

Such compounds are substantially different from the claimed esters, and polymers crosslinked with a compound similar to those disclosed in the '617 demonstrated inferior absorption properties, as set forth in the examples of the specification. The '617 patent provides no hint or apparent reason to utilize a low mole ratio of alkylene oxide to glycerol, and in fact discourages such a use. The '617 patent is directed to demulsification, i.e., separating oil and water, not to an SAP which is designed to absorb aqueous liquids. The cited reference simply provides no incentive to alter the teachings of the '617 patent, then use a claimed ester to provide a hydrogel, let alone a hydrogel having the absorption properties recited in claims 26, 27, and 32-34.

With respect to article claims 29 and 30, the '617 patent is silent with respect to including a disclosed polymer in any article, but merely teaches use of the polymer as a demulsifier.

In view of the above, appellants submit that claims 14-16, 26, 27, 29, 30, and 32-34 would not have been obvious over the '617 patent.

### **3. Response to Examiner Arguments in Advisory Action**

The examiner's comments in the Advisory Action of February 2, 2008 are set forth above in Section IX.E.4. above. Appellants now address reference numbers (1) and (2) of the examiner's comments.

(1) Postcrosslinking process – The '617 patent at column 7, lines 37-50, teaches that the molecular weight of the polymers can be increased in a subsequent step by additional crosslinking. As taught by the '617 patent, the polymer prepared therein is in *solution* and an additional crosslinking agent is added to react further with the polymer and increase the molecular weight of the polymer. The result is a viscous solution. See '617 patent, column 15, lines 41-45.

The subsequent postcrosslinking of the '617 patent is different from the postcrosslinking recited in the claims. The present postcrosslinking step is disclosed at page 27, line 33 through page 16. A postcrosslinker is added to crosslink only the surfaces of the hydrogel, see specification page 28, lines 2 and 3. The SAP is sprayed to form droplets, a postcrosslinker is applied to the surfaces of the droplets, and the resulting droplets are heated to dry and surface crosslink the SAP *particles*.

It is well known in the art to surface postcrosslink SAP particles as set forth in, "Modern Superabsorbent Polymer Technology," F. Buchholz et al., eds., Wiley-VCH, New York, NY (1998), pages 97-103. It is clear that the term "postcrosslinking", as well-known and used in the art of SAPs, refers to surface crosslinking that improves the absorption properties of the SAP. The additional crosslinking is limited to the surface areas of the SAP particles.



This is substantially different from providing additional crosslinks throughout a polymer in solution to increase the molecular weight of the polymer. If the additional crosslinking step of the '617 patent was performed, the resulting particle would not be a *hydrogel*, as claimed. The excessive amount of crosslinking would not permit the absorption and retention of aqueous fluids required by a hydrogel, e.g., an SAP. The additional crosslinking taught in the '617 patent would therefore destroy the hydrogels of the present invention.

(2) Drying step – The examiner relies upon the '617 patent, column 8, lines 55-61 and column 15, lines 55-65 to support a contention of rapid water removal or drying. The relied upon portions of the '617 patent disclose adding "a demulsifier composition" of the '617 patent (i.e., a polymer) to a crude oil emulsion in order to break the emulsion ('617 patent, column 8, lines 49-54). The crude oil emulsions are "easily separated" into clean oil and brine ('617 patent, column 8, lines 40-48). The '617 patent, at line 15, lines 55-65 demonstrates that the *copolymers* demulsify crude oil, and the amount of water "separated off was recorded".

These portions of the '617 patent again relate to the copolymer of an oxyalkylated monomer and a hydrophilic monomer, and *use* of the *polymer* to demulsifying crude oil. These portions of the '617 patent do not remotely relate to present claim 16, which is directed to a process for preparing a crosslinked hydrogel.

Furthermore, the '617 patent is not remotely directed to the claimed drying step, it is directed to "separating" water from oil in a crude oil emulsion. Present claim 16 recites "drying" the reaction mixture obtained for step k), i.e., removing the remaining water from the polymer by heating the polymers. See specification, page 28, lines 1-16.

Importantly, it must be further noted that the drying step recited in the claims refers to drying of the crosslinked hydrogel. Should the demulsification of the '617 patent somehow be considered as a drying step, it is the *oil* that is being dried in the '617 patent, not the demulsifying polymer. In contrast to the presently claimed drying step, the polymer of the '617 patent is being *hydrated* by its addition to a water-containing crude oil emulsion.

**G. REJECTION OF CLAIMS 18 AND 21-23 UNDER 35 U.S.C. §102(B) AS BEING ANTICIPATED BY THE '617 PATENT**

Claim 18 is directed to a crosslinked hydrogel crosslinked with an ester of claim 1 or a compound of structural formula Ia wherein AO can be solely EO or PO. Claim 21 is directed a composition comprising (a) an ester of claim 1 or a compound of structural formula Ia wherein AO can be solely EO or PO and (b) at least one hydrophilic monomer. Dependent claim 22 recites that the composition of claim 1 further comprises a diluent. Claim 23 recites a hydrogel prepared from the composition of claim 21 and optionally postcrosslinked.

**1. Rejection of Claims 18 and 21-23 as Being Anticipated by the '617 Patent**

With respect to ester F of claims 18 and 21, the '617 patent specifically discloses a ratio of alcohol to alkoxides or from 1:120 to 1:5. See '617 patent at column 3, lines 64 and 65. Claims 18 and 21 recite a sum of  $p1 + p2 + p3$  is 3 or 4. Accordingly, a difference exists between the '617 patent and present claims 18 and 21-23 such that a rejection under 35 U.S.C. §102(b) cannot be maintained.

Furthermore, the '617 patent fails to teach the claimed ester component with sufficient specificity to serve as an anticipating reference for the same reasons claim 1 is patentable over EP '287. See Sections IX.B and D., and incorporated herein. The '617 reference teaches a broad range of esters, but does not allow a person skilled in the art to clearly envision the claimed esters. The '617 patent examples fail to disclose any alkoxylated glycerol, and in each example the total number of moles of alkoxylate is far greater than the claimed number of moles of EO and PO, i.e., 3 or 4.

In view of the above, appellants submit that claims 18 and 21-23 are not anticipated by the '617 patent and that the rejection should be withdrawn.

**2. Nonobviousness of Claims 18 and 21-23**

Although claims 18 and 21-23 were not officially rejected as being obvious over the '617 patent, the above described differences between these claims and the '617 patent are nonobvious differences. The '617 patent generally teaches monofunctional and

multifunctional alcohols at column 3, lines 36-53. Glycerol is disclosed among more than specific 20 alcohols. The '617 patent also discloses 15 alkoxyated alcohols at Table 1 of the reference. No disclosed alkoxyated alcohol in the examples is glycerin, and the ratio of alcohol to alkylene oxide is far above the ratio of 1 to 3 and 1 to 4 recited in claims 18 and 21, e.g., Example a3 of the '617 patent has a ratio of 1 to about 49, Example a4 has a ratio of 1 to about 36. Example a5 has a ratio of 1 to about 66, and Example a6 is 1 to about 40.

The specific teachings of the '617 patent therefore are directed to alkoxyated alcohols containing a high amount of alkylene oxide in order to perform their intended function of demulsifying a crude oil emulsifier. Persons skilled in the art, after reading the '617 patent, would have had no apparent reason to select glycerin from the long list of disclosed alcohols, then alkoxyate with only 3 or 4 ethylene oxide and/or propylene oxide units. Accordingly, it is submitted that claims 18 and 21-23 would not have been obvious to a person of ordinary skill in the art in view of the '617 patent.

With respect to the examiner's contentions regarding the term "diluent" in claim 22, claim 10 of the '617 patent refers to an oil/water mixture to which the *copolymer* is added to *effect* demulsification. The "crude oil and water mixture" is *not* present in the composition prior to polymerization as recited in claim 22, but a polymer is added to the crude oil emulsion after polymerization. See '617 patent, column 8, lines 40-61. Claim 22 further recites that the diluent is water and/or a water-soluble organic solvent, as opposed to crude oil.

With respect to the examiner's comments regarding the '617 patent at column 1, lines 52-62, this portion of the '617 specification is directed to *prior* resins that demonstrates *disadvantages*, such as gelling. The '617 patent disclosure is not directed to the resins disclosed at column 1, lines 52-62, but to resins that may overcome these disadvantages. The '617 patent therefore is directed to resins that do *not* gel, in contrast to the presently claimed SAPs.

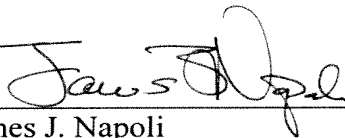
In view of the foregoing, substantial differences exist between the '617 patent and claims 18 and 21-23, and these claims would not have been obvious over the '617 patent under 35 U.S.C. §103.

**X. CONCLUSION**

In view of the foregoing remarks, appellants respectfully request that the Board reverse the final rejection of claims 1, 4-7, 10-16, 18, 21-23, 27, 29, 30, and 32-34, and that all pending claims should be allowed.

Dated: May 15, 2008

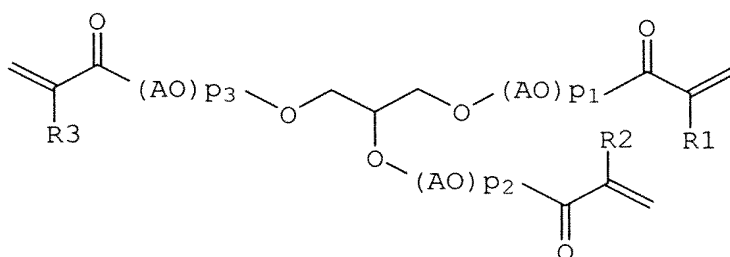
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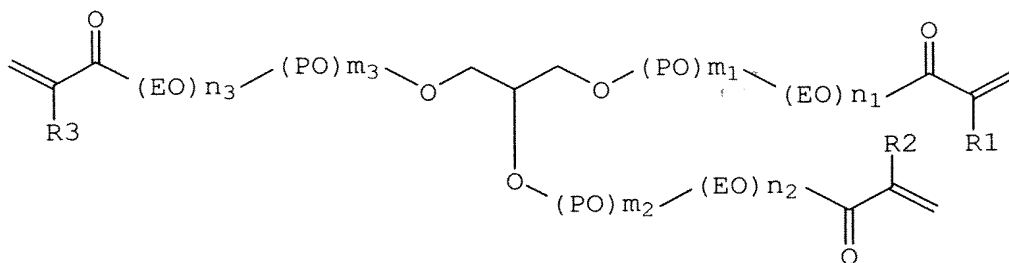
**CLAIMS APPENDIX****Claims on Appeal in Application Serial No. 10/516,702**

1. (Previously presented) An ester F of formula Ia



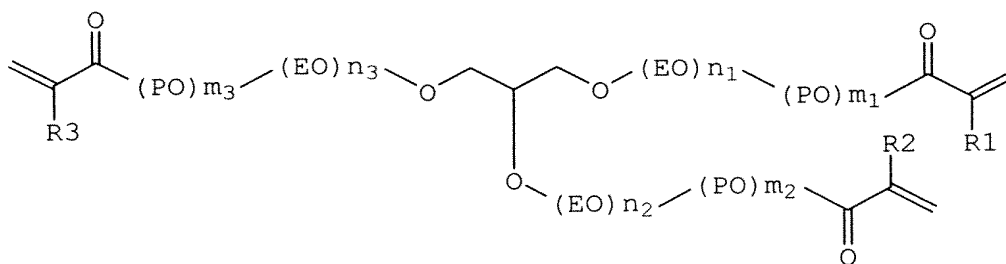
Ia

or formula Ib



Ib

or formula Ic



Ic

wherein AO is for each AO independently EO or PO,

EO is O-CH<sub>2</sub>-CH<sub>2</sub>-,

PO is at each instance independently O-CH<sub>2</sub>-CH(CH<sub>3</sub>)- or O-CH(CH<sub>3</sub>)-CH<sub>2</sub>-

a sum of m<sub>1</sub> + m<sub>2</sub> + m<sub>3</sub> + n<sub>1</sub> + n<sub>2</sub> + n<sub>3</sub> is 3, 4, or 5,

a sum of m<sub>1</sub> + m<sub>2</sub> + m<sub>3</sub> is 1, 2, 3, or 4,

a sum of  $p_1 + p_2 + p_3$  is 3, 4, or 5, and

$R_1$ ,  $R_2$ , and  $R_3$  are independently H or  $CH_3$ ,

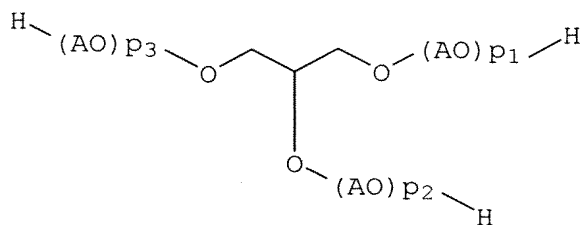
wherein at least one AO is PO and at least one further AO is EO.

4. (Previously presented) The ester F of claim 1 wherein the sum of  $m_1 + m_2 + m_3 + n_1 + n_2 + n_3$  or  $p_1 + p_2 + p_3$  is equal to 3 or 5.

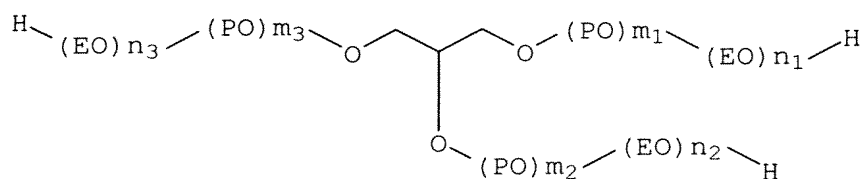
5. (Previously presented) The ester F of claim 1 wherein 3 POs are present in total.

6. (Previously presented) The ester F of claim 1 wherein at least one PO is present in each of the 3 alkoxy chains of glycerol.

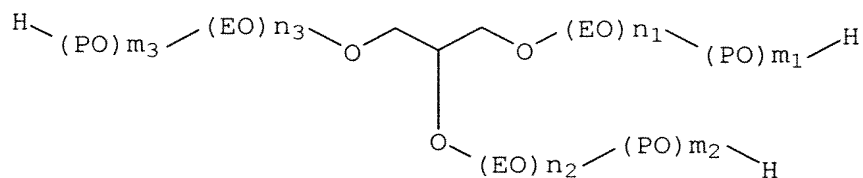
7. (Previously presented) A process for preparing an ester F of claim 1 from an alkoxyated glycerol of the formula IIa, IIb, or IIc



IIa



IIb



IIc

wherein AO, EO, PO, n1, n2, n3, m1, m2, m3, p1, p2, and p3 are each as defined in claim 1,

and (meth)acrylic acid, comprising the steps of

- a) reacting the alkoxyated glycerol with the (meth)acrylic acid in the presence of at least one esterification catalyst C, at least one polymerization inhibitor D, and optionally a water-azeotroping solvent E to form the ester F,
- b) optionally removing from the reaction mixture some or all of the water formed in a), during and/or after a),
- f) optionally neutralizing the reaction mixture,

h) when a solvent E is used, optionally removing the solvent E by distillation, and/or

i) stripping with a an oxygen-containing gas which is inert under the reaction conditions, wherein

a molar excess of (meth)acrylic acid to alkoxylated glycerol is at least 3.15:1

and

the optionally neutralized (meth)acrylic acid present in the reaction mixture after the last process step substantially remains in the reaction mixture.

10. (Previously presented) The process of claim 7 wherein the (meth)acrylic acid is not more than 75% by weight removed from the reaction mixture obtained after the last process step, which reaction mixture contains the ester F.

11. (Previously presented) The process of claim 7 wherein the reaction mixture obtained after the last process step, which comprises the ester F, has a DIN EN 3682 acid number of at least 25 mg of KOH/g.

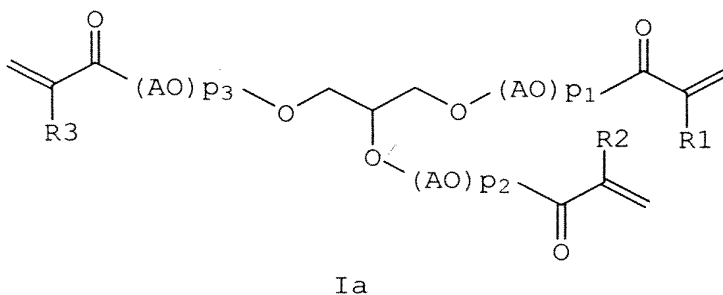
12. (Previously presented) The process of claim 7 wherein the reaction mixture obtained after the last process step, which comprises the ester F, has a (meth)acrylic acid content of at least 0.5% by weight.

13. (Previously presented) The process of claim 7 wherein the molar ratio of (meth)acrylic acid to alkoxylated glycerol in step a) is at least 15:1.



14. (Previously presented) A process for preparing a crosslinked hydrogel, comprising the steps of

- k) polymerizing an ester F of claim 1 or an ester F of the formula Ia



wherein AO is for each AO independently EO or PO,

EO is O-CH<sub>2</sub>-CH<sub>2</sub>-,

PO is at each instance independently O-CH<sub>2</sub>-CH(CH<sub>3</sub>)- or O-CH(CH<sub>3</sub>)-CH<sub>2</sub>-

a sum of p<sub>1</sub> + p<sub>2</sub> + p<sub>3</sub> is 3, 4, or 5,

R<sub>1</sub>, R<sub>2</sub>, and R<sub>3</sub> are independently H or CH<sub>3</sub>,

with (meth)acrylic acid, optionally an additional monoethylenically unsaturated compound N, and optionally one further copolymerizable hydrophilic monomer M, in the presence of at least one free-radical initiator K, and optionally of at least one grafting base L,

- l) postcrosslinking the reaction mixture obtained from k),  
 m) drying the reaction mixture obtained from k) or l), and  
 n) optionally grinding and/or sieving the reaction mixture obtained from k), l), or m).

15. (Previously presented) The process of claim 14 wherein AO is EO.

16. (Previously presented) The process for preparing a crosslinked hydrogel, comprising steps a) to i) of claim 7 and additionally

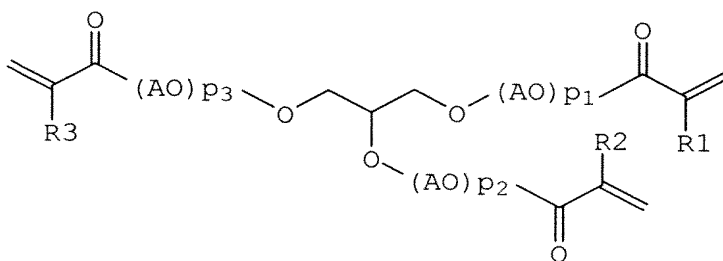
k) polymerizing the reaction mixture from one of stages a) to i) if performed, with an optionally additional monoethylenically unsaturated compound N, and optionally at least one further copolymerizable hydrophilic monomer M, in the presence of at least one free-radical initiator K and optionally at least one grafting base L,

l) optionally postcrosslinking the reaction mixture obtained from k),

m) drying the reaction mixture obtained from k) or l), and

n) optionally grinding and/or sieving the reaction mixture obtained from k), l), or m).

18. (Previously presented) A crosslinked hydrogel comprising at least one hydrophilic monomer M in polymerized form crosslinked with an ester F of claim 1 or an ester F of formula Ia



Ia

wherein AO is for each AO independently EO or PO,

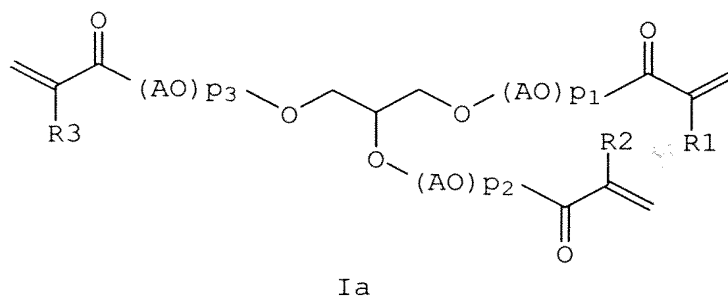
EO is O-CH<sub>2</sub>-CH<sub>2</sub>-,

PO is at each instance independently O-CH<sub>2</sub>-CH(CH<sub>3</sub>)- or O-CH(CH<sub>3</sub>)-CH<sub>2</sub>-

a sum of p<sub>1</sub> + p<sub>2</sub> + p<sub>3</sub> is 3 or 4

R<sub>1</sub>, R<sub>2</sub>, and R<sub>3</sub> are independently H or CH<sub>3</sub>.

21. (Previously presented) A composition comprising from 0.1% to 40% by weight of at least one ester F of claim 1 or an ester F of formula Ia



wherein AO is for each AO independently EO or PO,  
 EO is O-CH<sub>2</sub>-CH<sub>2</sub>-  
 a sum of p<sub>1</sub> + p<sub>2</sub> + p<sub>3</sub> is 3 or 4,  
 R<sub>1</sub>, R<sub>2</sub>, and R<sub>3</sub> are independently H or CH<sub>3</sub>,  
 and (meth)acrylic acid,  
 0.5-99.9% by weight of at least one hydrophilic monomer M,  
 0-10% by weight of at least one esterification catalyst C,  
 0-5% by weight of at least one polymerization inhibitor D, and  
 0-10% by weight of a solvent E,  
 with the proviso that the sum total is always 100% by weight.

22. (Previously presented) The composition of claim 21 further comprising a diluent G, said diluent selected from the group consisting of water, a mixture of water and one or more organic solvent that is soluble in water in any proportion, and a mixture of water and one or more monohydric and/or polyhydric alcohol.

23. (Previously presented) A crosslinked hydrogel prepared from a composition of claim 21 and optionally postcrosslinked.

26. (Previously presented) A crosslinked hydrogel of claim 14 having a saponification index of less than 11.

27. (Previously presented) A crosslinked hydrogel of claim 14 having a residual crosslinker content of less than 10 ppm.

29. (Previously presented) An article comprising a polymer prepared according to the method of claim 14.

30. (Previously presented) The article of claim 29 selected from the group consisting of a hygiene article, a packaging material, and a nonwoven.

32. (Previously presented) The crosslinked hydrogel of claim 26 having a saponification index of less than 8.

33. (Previously presented) The crosslinked hydrogel of claim 26 having a saponification index of less than 5.

34. (Previously presented) The crosslinked hydrogel of claim 27 having a residual crosslinker content of less than 5 ppm.

**EVIDENCE APPENDIX**

"Hawley's Condensed Chemical Dictionary, Thirteenth Ed." (1997), page 1052. (submitted with Amendment "A" on August 1, 2007)

"Modern Superabsorbent Polymer Technology", F. Buchholz et al., eds., Wiley-VCH, New York, NY (1997), pages 39-44. (submitted with Amendment "A" on August 1, 2007)

**RELATED PROCEEDINGS APPENDIX**

There are no related proceedings.

Docket No.: 29827/40663  
(PATENT)

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

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In re Patent Application of:  
Andreas A. Popp et al.

Application No.: 10/516,702

Confirmation No.: 6743

Filed: December 2, 2004

Art Unit: 1796

For: (Meth)Acrylic Esters of Polyalkoxylated Glycerine

Examiner: Wililam K. Cheung

**APPEAL BRIEF**

MS Appeal Brief - Patents  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

This Appeal Brief is submitted in triplicate to support the Notice of Appeal, filed in this application on March 12, 2008. This Appeal Brief is accompanied by the fee for filing an Appeal Brief under 37 C.F.R. §1.17(b) and a one-month extension of time under 37 C.F.R. §1.136(a). Accordingly, this Appeal Brief is timely filed and no further fees and believed due.

Any additional required fee may be charged, or any overpayment credited, to Deposit Account No. 13-2855.

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**III. REAL PARTY IN INTEREST**

The real party in interest in this appeal is BASF Aktiengesellschaft (BASF), Ludwigshafen, Germany, the assignee of the entire right, title, and interest to the above-identified patent application. The assignment was recorded in the United States Patent and Trademark Office ("USPTO") at Reel 16550, Frame 0462 on May 11, 2005, which constitutes the entire chain of title from the inventors to BASF.

**IV. RELATED APPEALS AND INTERFERENCES**

There are no related appeals or interferences known to appellants, appellants' legal representative, or the assignee which will directly affect or be directly affected by, or have a bearing on, the Board's decision in the pending appeal.

**V. STATUS OF CLAIMS**

**A. HISTORY**

This application was originally filed with claims 1-28. Claims 29-34 were added to the application in a preliminary amendment.

**B. CURRENT STATUS OF CLAIMS**

Claims cancelled: 2, 3, 8, 9, 17, 19, 20, 24, 25, 28, and 31.

Claims withdrawn from consideration but not cancelled: None.

Claims pending: 1, 4-7, 10-16, 18, 21-23, 26, 27, 29, 30, and 32-34.

Claims allowed: None.

Claims rejected: 1, 4-7, 10-16, 18, 21-23, 26, 27, 29, 30, and 32-34.

**C. CLAIMS ON APPEAL**

The claims on appeal are claims 1, 4-7, 10-16, 18, 21-23, 26, 27, 29, 30, and 32-34.

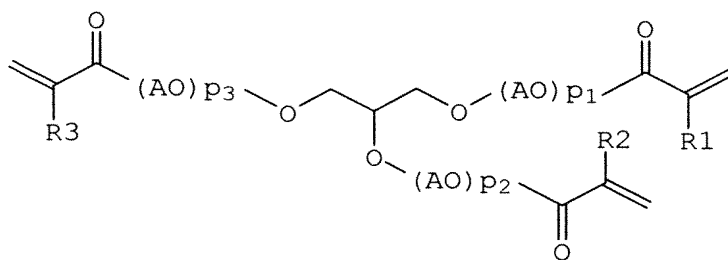
**VI. STATUS OF AMENDMENTS**

Appellants filed an after-final amendment on January 25, 2008. The amendment was not entered, as indicated in the Advisory Action mailed February 2, 2008. Accordingly, appellants understand that the current form of the claims are represented by Amendment "A", filed August 1, 2007, and as reproduced in the Claims Appendix below.

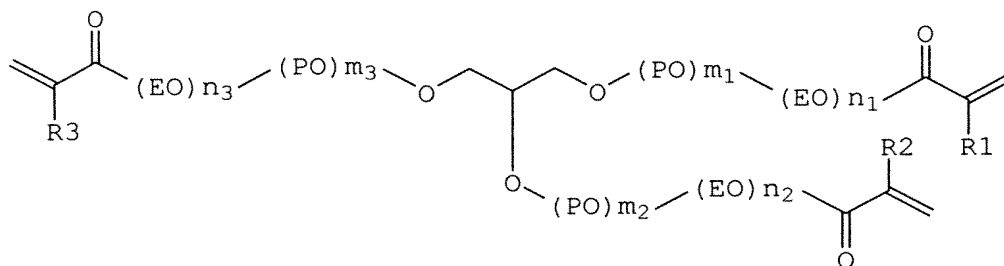
## VII. SUMMARY OF CLAIMED SUBJECT MATTER

The claimed subject matter relates to (meth)acrylic esters of polyalkoxylated glycerol (claims 1 and 4-6), a process for preparing the (meth)acrylic esters (claims 7 and 10-13), a process for preparing a crosslinked hydrogel using the (meth)acrylic esters (claims 14-16), a composition for preparing a crosslinked hydrogel (claims 21 and 22), a crosslinked hydrogel prepared from the (meth)acrylic esters (claims 18, 23, 26, 27, and 32-34), and articles comprising the crosslinked hydrogel (claims 29 and 30). Application specification, page 5, lines 5-26; page 7, lines 22-33; page 8, lines 17-31; and page 33, lines 17 and 18. The inventors have found that improved liquid absorbency properties are exhibited by hydrogels when a claimed (meth)acrylic ester of polyalkoxylated glycerol is used as a crosslinking agent. Specification, page 51, Tables 1 and 2.

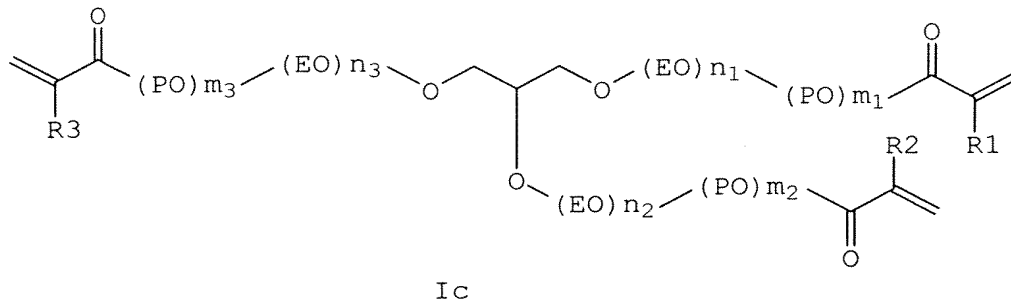
The recited (meth)acrylic esters of claim 1 contain a glycerol base, wherein each hydroxy group of the glycerol is alkoxylated with ethoxy *and* propoxy groups in *each* of the three alkylene oxide chains. The recited (meth)acrylic esters of claim 1 have the following structures Ia, Ib, and Ic:



Ia



Ib



wherein AO is for each AO independently EO or PO,

EO is O-CH<sub>2</sub>-CH<sub>2</sub>,

PO is at each instance independently O-CH<sub>2</sub>-CH(CH<sub>3</sub>)- or O-CH(CH<sub>3</sub>)-CH<sub>2</sub>-

a sum of m<sub>1</sub> + m<sub>2</sub> + m<sub>3</sub> + n<sub>1</sub> + n<sub>2</sub> + n<sub>3</sub> is 3, 4, or 5,

a sum of m<sub>1</sub> + m<sub>2</sub> + m<sub>3</sub> is 1, 2, 3, or 4,

a sum of p<sub>1</sub> + p<sub>2</sub> + p<sub>3</sub> is 3, 4, or 5, and

R<sub>1</sub>, R<sub>2</sub>, and R<sub>3</sub> are independently H or CH<sub>3</sub>,

wherein at least one AO is PO and at least one further AO is EO.

Specification, page 5, line 10 through page 7, line 2.

The total number of alkoxy groups in (meth)acrylic esters Ia, Ib, and Ic is 3, 4, or 5. Specification, page 5, line 10 through page 7, line 2. Specific numbers of alkoxy groups and specific identities of alkoxy groups are recited in claims 4-6. Specification, page 7, lines 4-13.

The (meth)acrylic esters of polyalkoxylated glycerol recited in claims 1 and 4-6 are prepared by a simplified process. Specification page 5, lines 5-8. Claim 7 recites the simplified process, as disclosed in the specification at page 7, lines 22-40, wherein an excess molar amount (at least 3.15 to 1) of (meth)acrylic acid is used in the process and remains in the reaction mixture. Claim 13 recites that this excess molar amount of (meth)acrylic acid is at least 15:1 (specification page 8, lines 12-13 and page 23, lines 6-9).

Claim 10 recites that the (meth)acrylic acid is not more than 75% by weight removed from the reaction mixture obtained after the last process step (specification, page 23, lines 19-20), and claim 11 recites that the reaction mixture after the last process step has an acid number of at least 25 mg of KOH/g (specification, page 23, lines 32-34). Claim 12

recites that the reaction mixture, after the last step, has a (meth)acrylic acid content of at least 0.5%, by weight.

The claims also are directed to a process for preparing a crosslinked hydrogel using a (meth)acrylic ester of claim 1 or an ester formula Ia, wherein an alkoxy chain can be solely ethoxy or solely propoxy, as crosslinking agents for (meth)acrylic acid (claim 14). Specification, page 25, lines 21-30; page 28, line 19; and page 32, line 6-13. Claim 15 recites that AO of compound Ia of claim 14 is EO. Specification, page 5, line 28. Claim 16 recites additional process steps for preparation of a crosslinked hydrogel after performing the process of claim 7. Specification page 25, lines 21-30, page 28, lines 1-9, and page 32, lines 6-13.

Claim 26 recites a crosslinked hydrogel prepared by the process of claim 14 and having a saponification index of less than 11. Specification, page 33, lines 1-5 and page 51, Table 2. Claim 27 recites a crosslinked hydrogel prepared by the process of claim 14 and having an residual crosslinker content of less than 10 ppm. Specification, page 33, lines 7-12 and page 51, Table 2. Claims 32-34 recite crosslinked hydrogels having a saponification index of less than 8, or less than 5 (specification, page 33, lines 1-5), or a residual crosslinker content of less than 5 ppm (specification, page 33, lines 7-12).

Claim 18 recites a crosslinked hydrogel comprising a hydrophilic monomer in polymerized form crosslinked with a (meth)acrylic ester of claim 1 or an ester of formula Ia wherein an alkoxy chain can be solely ethoxy or solely propoxy and the total number of alkoxy groups is 3 or 4. The crosslinked hydrogel is prepared using a composition of claim 21. Specification, page 24, line 27-page 25, line 4. Claim 22 recites that the composition of claim 21 further comprises a diluent G. Specification, page 25, lines 3 and 4, and page 28, lines 23-25. Claim 23 recites a crosslinked hydrogel, optionally postcrosslinked, prepared from a composition of claim 21. Specification, page 27, lines 33-35.

Claims 29 and 30 recite an article comprising a polymer prepared by the method of claim 14, wherein the article can be a hygiene article, a packaging material, or a monomer. Specification, page 33, lines 17 and 18, and page 34, lines 32-33.

**VIII. GROUND OF REJECTION TO BE REVIEWED ON APPEAL**

Whether claims 1 and 4-6 are anticipated under 35 U.S.C. §102(b) by Matsui et al. EP 0 777 287 (EP '287).

Whether claims 7 and 10 are anticipated under 35 U.S.C. §102(b) by Barthold et al. U.S. Patent No. 5,472,617 ('617).

Whether claims 11-13 would have been obvious under 35 U.S.C. §103 over the '617 patent.

Whether claims 14-16 are anticipated under 35 U.S.C. §102(b) by the '617 patent.

Whether claims 18 and 21-23 are anticipated under 35 U.S.C. §102(b) by the '617 patent.

Whether claims 26, 27, 29, 30, and 32-34 are anticipated under 35 U.S.C. §102 by, or alternatively, would have been obvious under 35 U.S.C. §103 over, the '617 patent.

For purposes of the issues on appeal, claims 4-6 are grouped and argued with claim 1.

Claims 10-13 are grouped with claim 7 to form a second group that is separately argued.

Claims 15, 26, 27, 29, 30, and 32-34 are grouped with claim 14 and claim 16 to form a third group that is separately argued.

Claims 18 and 21-23 form a fourth group that is separately argued.



**IX. ARGUMENT****A. INTRODUCTION**

Appellants submit that the rejections issued in the final Office Action are in error, and that the present application is in condition for allowance. Appellants respectfully request the Board to review and reverse each of the rejections issued in the final Office Action.

**B. PROPER BASIS FOR A §102(B) ANTICIPATION REJECTION**

"Anticipation requires a showing that each limitation of a claim is found in a single reference, either expressly or inherently." *Atofina v. Great Lakes Chemical Corp.*, 441 F.3d 991, 999 (Fed. Cir. 2006).

When a claim recites a limitation as a range of numerical values, a reference must describe the range with sufficient specificity to anticipate. *Atofina*, 441 F.3d at 999-1000. Disclosed ranges that only slightly overlap a claimed range do not describe the range with sufficient specificity. See *id.* (reversing findings of anticipation on the basis that (1) a disclosed temperature range of 150 to 350°C only slightly overlapped a claimed range of 330 to 450°C, and (2) a disclosed concentration range of 0.001 to 1.0% only slightly overlapped a claimed range of 0.1 to 5.0%); *Ex parte Hayashi*, 2007 WL 1874815, \*5-6 (B.P.A.I. 2007) (Appeal No. 2007-0665) (reversing an anticipation rejection, finding that a disclosed thickness range of about 100 nm to 500 nm, absent any specific examples less than 100 nm, failed to describe a claimed thickness range of less than 100 nm with sufficient specificity). Further, a reference disclosing a range that is very close to (but which does not overlap or touch) the claimed range does not anticipate the claimed range. MPEP §2131.02(II)(8<sup>th</sup> ed., Rev. 6, Sept. 2007) (citing *Titanium Metals Corp. v. Banner*, 778 F.2d 775 (Fed. Cir. 1985)).

The disclosure of a genus in the prior art is not necessarily a disclosure of every specie that is a member of the disclosed genus. *Atofina*, 441 F.3d at 999. In particular, the disclosure of a range does not constitute a specific disclosure of the endpoints of that range. See *id.* at 1000 (noting that a disclosed range of 150 to 350°C was neither a disclosure of 150°C nor 350°C); see also *Hayashi* at \*6 (finding it irrelevant that the lower limit of "about 100 nm" or the disclosed thickness range could be interpreted to include thicknesses

within the recited range of "less than 100 nm"); *Ex parte Hayes*, 2007 WL 49708, \*9 (B.P.A.I. 2007) (Appeal No. 2006-0990) (noting that end points of a disclosed range do not reflect "data points" for anticipation determination).

With further respect to a rejection under 35 U.S.C. §102(b), MPEP §2131 states:

"TO ANTICIPATE A CLAIM, THE REFERENCE MUST TEACH EVERY ELEMENT OF THE CLAIM"

'A claim is anticipated only if each and every elements as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.' *Verdegual Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987)...'The identical invention must be shown in as complete detail as is contained in the...claim.' *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). The elements must be arranged as required by the claim, but this is not an *ipsissimis verbis* test, i.e., identity of terminology is not required. In *re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990)."

In addition, MPEP §2131.03 II. states:

"PRIOR ART WHICH TEACHES A RANGE WITHIN, OVERLAPPING, OR TOUCHING THE CLAIMED RANGE ANTICIPATES IF THE PRIOR ART RANGE DISCLOSES THE CLAIMED RANGE WITH "SUFFICIENT SPECIFICITY"

When the prior art discloses a range which touches, overlaps or is within the claimed range, but no specific examples falling within the claimed range are disclosed, a case by case determination must be made as to anticipation. In order to anticipate the claims, the claimed subject matter must be disclosed in the reference with "sufficient specificity to constitute an anticipation under the statute." What constitutes a "sufficient specificity" is fact dependent. If the claims are directed to a narrow range, the reference teaches a broad range, depending on the other facts of the case, it may be reasonable to conclude that the narrow range is not disclosed with "sufficient specificity" to constitute an anticipation of the claims. The unexpected results may also render the claims unobvious. The question of "sufficient specificity" is similar to that of "clearly envisaging" a species from a generic teaching. See MPEP § 2131.02. A 35 U.S.C. 102/ 103 combination rejection is permitted if it is unclear if the reference teaches the

range with "sufficient specificity." The examiner must, in this case, provide reasons for anticipation as well as a motivational statement regarding obviousness. *Ex parte Lee*, 31 USPQ2d 1105 (Bd. Pat. App. & Inter. 1993) (expanded Board). For a discussion of the obviousness of ranges see MPEP § 2144.05."

Two recent CAFC decisions support the reasoning stated in MPEP §2131.03

II. In *Eli Lilly & Co. v. Zenith Goldline Pharm. Inc.*, 81 U.S.P.Q. 2d, 1324 (Fed. Cir. 2006), the court stated that for a reference to anticipate a claim, the reference must *expressly* spell out a definite and limited class of compounds that enable a person skilled in the art to at once envisage each member of this limited class.

In *Impax Labs, Inc. v. Aventis Pharma Inc.*, 468 F.3d 1366 (Fed Circ. 2006), the court stated that the prior art patent disclosed such a large number of compounds that one of ordinary skill in the art would not have recognized that the claimed compound was useful to treat a disease without additional details or guidance, which was not found in the prior art patent.

Also see *In re Petering and Fall*, 133 USPQ 275, 299 (C.C.P.A. 1962), cited in *Impax Labs*, wherein the court stated:

"Next we consider the legal effect of the generic and specific descriptions of isoalloxazine structures in the Karrer patent. The generic formula of Karrer, "wherein X, Y, Z, P, and R' represent either hydrogen or alkyl radicals, R a side chain containing an OH group," encompasses a vast number and perhaps even an infinite number of compounds since there is no express limit on the size of the alkyl group or the structure and size of R. Even though appellants' claimed compounds are encompassed by this broad generic disclosure, we do not think this disclosure by itself *describes* appellants' invention, as defined by them in any of the appealed claims, within the meaning of 35 U.S.C. 102(b)."

### C. PROPER BASIS FOR A §103(a) OBVIOUSNESS REJECTION

A determination that a claimed invention would have been obvious under §103(a) is a legal conclusion involving four factual inquiries: (1) the scope and content of the prior art; (2) the differences between the claimed invention and the prior art; (2) the differences between the claimed invention and the prior art; (3) the level of ordinary skill in the pertinent art; and (4) secondary considerations, if any, of non-obviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966). Secondary considerations of non-obviousness include factors such as commercial success, long-felt but unresolved needs, the failure of others, and/or *unexpected results achieved by the claimed invention*. *Id.* Obviousness is determined from the vantage point of a hypothetical person having ordinary skill in the art which the claimed subject matter pertains, who is presumed to have all prior art references in the field of the invention available to him/her. *In re Rouffet*, 149 F.3d 1350, 1357 (Fed. Cir. 1998). Furthermore, obviousness must be determined as of the time the invention was made and in view of the state of the art that existed at that time. *Uniroyal Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 1050-51 (Fed. Cir. 1988).

The Patent Office must clearly articulate facts and reasons why the claimed invention "as a whole" would have been obvious to a hypothetical person having ordinary skill in the art at least as of the claimed invention's effective filing date. *KSR Int'l Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1741 (2007) (citing with approval *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) ("[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.")); see also MPEP §2143 ("The key to supporting any rejection under 35 U.S.C. §103 is the clear articulation of reason(s) why the claimed invention would have been obvious.").

To reach a proper determination under 35 U.S.C. §103(a), the examiner must step backward in time and into the shoes worn by the hypothetical "person of ordinary skill in the art" when the invention was unknown and just before it was made. In view of all factual information, the examiner must then make a determination whether the claimed invention "as a whole" would have been obvious at that time to that person. Knowledge of applicants' disclosure must be put aside in reaching this determination, yet kept in mind in

order to determine the "differences," conduct the search, and evaluate the "subject matter as a whole" of the invention. The tendency to resort to "hindsight" based upon applicants' disclosure is often difficult to avoid due to the very nature of the examination process. However, impermissible hindsight must be avoided and the legal conclusion must be reached on the basis of the *facts* gleaned from the prior art. MPEP §2142.

Furthermore, to establish a *prima facie* case of obviousness, the examiner must satisfy three requirements. First, as the U.S. Supreme Court very recently held in *KSR International Co. v. Teleflex Inc. et al.*, 127 S.Ct. 1727 (2007), "a court must ask whether the improvement is more than the predictable use of prior art elements according to their established functions. ...it [may] be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was *an apparent reason* to combine the known elements in the fashion claimed by the patent at issue. ...it can be important to *identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements* in the way the claimed new invention does... because inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known." (emphasis added, *KSR, supra*). Second, the proposed modification of the prior art must have had a reasonable expectation of success, determined from the vantage point of the skilled artisan at the time the invention was made. *Amgen Inc. v. Chugai Pharm. Co.*, 18 USPQ2d 1016, 1023 (Fed. Cir. 1991). Lastly, the prior art references must teach or suggest all the limitations of the claims. *In re Wilson*, 165 USPQ 494, 496 (C.C.P.A. 1970).

As recently articulated by the Court of Appeals for the Federal Circuit in *Ortho-McNeil Pharmaceutical Inc. v. Mylan Laboratories Inc.*, 86 USPQ 2d, 1196, 1201-2 (Fed. Cir. 2008):

"As this court has explained, however, a flexible TSM test remains the primary guarantee against a non-statutory hindsight analysis such as occurred in this case. *In re Translogic Tech., Inc.* 504 F.3d 1249, 1257 [84 USPQ 2d 1929] (Fed. Cir. 2007) ("[A]s the Supreme Court suggests, a flexible

approach to the TSM test prevents hindsight and focuses on evidence before the time of invention.)."

Once the Patent Office properly sets forth a prima facie case of obviousness, the burden shifts to the applicants to come forward with evidence and/or argument supporting patentability. *See In re Glaug*, 283 F.3d 1335, 1338 (Fed. Cir. 2002). Rebuttal evidence is merely a showing of facts supporting the opposite conclusion." *In re Piasecki*, 745 F.2d 1468, 1472 (Fed. Cir. 1984). Evidence rebutting a prima facie case of obviousness can include: (a) "evidence of unexpected results," *Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348 1369 (Fed. Cir. 2007); (b) "evidence that the prior art teaches away from the claimed invention in any material respect," *In re Peterson*, 315 F.3d 1325, 1331 (Fed. Cir. 2003); and, (c) evidence of secondary considerations, such as commercial success or long-felt yet unmet needs, *WMS Gaming, Inc. v. International Game Tech.*, 184 F.3d 1339, 1359 (Fed. Cir. 1999). The Patent Office must always consider such evidence supporting patentability. *See, e.g., In re Sullivan*, 498 F.3d 1345, 1352-53 (Fed. Cir. 2007) (reversing a Patent Office decision of obviousness because the Patent Office failed to consider the applicants' evidence rebutting a prima facie case of obviousness because the Patent Office failed to consider the applicants' evidence rebutting a prima facie case of obviousness). If the Patent Office determines that such evidence is not compelling or is insufficient, then the Patent Office should specifically set forth the facts and reasoning supporting that determination. MPEP §2145 (8<sup>th</sup> Ed., Rev. 6, Sept. 2007).

**D. REJECTION OF CLAIMS 1 AND 4-6 UNDER 35 U.S.C. §102(B) AS BEING ANTICIPATED BY MATSUI ET AL. EP PATENT NO. 0 777 287**

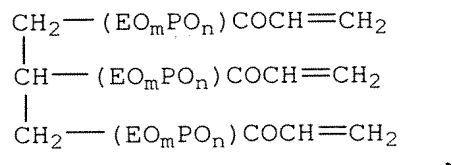
Compound claims 1 and 4-6, directed to (meth)acrylic esters of polyalkoxylated glycerin, stand rejected under 35 U.S.C. §102(b) as being anticipated by EP 0 777 287 (EP '287) based on the assertion that EP '287 discloses the ester F of claim 1.

**1. Disclosure of EP '287**

EP '287 is directed to non-aqueous electrolyte batteries having a negative electrode coated with a polymer film prepared from the compounds disclosed in EP '287. The EP '287 reference fails to teach copolymerization of the disclosed compounds, fails to suggest use of the compounds as a crosslinker for monoethylenically unsaturated monomers,

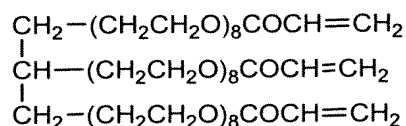
and is in no way related to superabsorbent polymers (SAPs) and a reduction of residual monomers in the production of SAPs.

The EP '287 rejection is based on formula (2), i.e., the *sole* glycerin-based compound of EP '287, having a formula:



wherein m and n do not represent 0 at the same time and  $0 \leq n$  and  $0 \leq m$  (EP '287, page 4, line 32). Accordingly, either EO *or* PO can be absent from the compound, and *no* "upper limit" exists for m, n, or the sum of m+n. EP '287 therefore discloses an infinite number of compounds.

In EP '287, the sole example directed to a glycerin-based compound is Embodiment 4, wherein n=8 and m=0, illustrated as compound (7) at page 8 of EP '287. This compound, having the following formula, is (a) *free* of PO units and (b) contains a sum of 24 EO units.



## 2. Rejection of Claims 1 and 4-6 as Anticipated by EP '287

Claims 1 and 4-6 stand rejected under 35 U.S.C. §102(b) as being anticipated by EP '277. Appellants submit that claims 1 and 4-6 are not anticipated by EP '277 because EP '287 fails to disclose the recited esters with sufficient specificity to anticipate claims 1 and 4-6, as required by *Atofina*.

Claims 1 and 4-6 are directed to an ester F that *requires* the presence of *both* PO *and* EO units in *each* of the three alkylene oxide chains of the claimed glycerin compound. In addition, the total number of EO and PO units in a claimed ester F (not in each alkylene oxide chain) is 3, 4, or 5, as recited. It is submitted, therefore, that even though the

very general, broad teachings of EP '287 may encompass a presently claimed ester F, EP '287 does not anticipate claims 1 and 4-6 under 35 U.S.C. §102(b).

The teachings of EP '287 are to a broad a range of compounds, including both glycerin-based compounds and trimethylolpropane-based compounds. EP '287 discloses an infinite number of compounds because no upper limit is placed on either variable "m" or "n". In addition, either "m" or "n", but not both, can be zero. The reference therefore fails to disclose the genus of compounds therein with any specificity.

The *sole* specific example in EP '287 directed to glycerin-based compounds is compound (7) which contains 24 EO groups and no PO groups, as illustrated above. Accordingly, EP '287 fails to disclose any specific examples encompassed by the claimed compounds, i.e., a glycerin-based compound containing *both* EO and PO groups, wherein the sum of EO and PO is in the claimed narrow range of 3 to 5. All examples in EP '287 contain from 18 to 48 total EO and/or PO units.

As set forth in the MPEP §2131, the present claims are directed to a narrow range within the wide range of the reference, wherein the reference fails to disclose a specific example within the claimed range. It is submitted therefore that EP '287 fails to disclose the claimed subject matter with sufficient specificity to constitute an anticipation under 35 U.S.C. §102(b).

The esters of EP '287 and claimed esters are considerably different, spanning entirely different multiples of total EO and PO units. This level of dissimilarity falls even further below the threshold anticipation requirement of "sufficient specificity" set forth in *Atofina*, where even *slightly overlapping* disclosed and recited ranges were held non-anticipatory. *Atofina*, 441 F.3d at 999-1000; *see also Hayashi* at \*5-6.

Accordingly, EP '287 does not disclose the recited compounds with sufficient specificity and appellants submit that the rejection of claims 1 and 4-6 under 35 U.S.C. §102(b) should be reversed.



### 3. Non-obviousness of Claims 1 and 4-6

EP '287 fails to anticipate claims 1 and 4-6 and EP '287 fails to render claims 1 and 4-6 obvious under 35 U.S.C. §103. In particular, the presently claimed esters exhibit unexpected benefits in the preparation of superabsorbent polymers (SAPs) compared to polyalkoxylated esters similar to those disclosed in EP '287.

The present specification, Table 1 at page 51, includes seven esters (a through g) that are used as crosslinkers in the preparation of an SAP. Examples f and g are comparative because they (a) are based on trimethylolpropane (TMP), (b) contain only EO units, and (c) contain more than a total of 5 EO and PO groups, i.e., Example g. Examples c-e are esters of present claim 1, i.e., based on glycerin, contain EO *and* PO units, and contain a total of up to 5 PO and EO units. Comparative Example g is the most similar example to the EP '287 disclosure, i.e., based on TMP, containing only EO units, and containing 15 EO units. See Embodiment 1 of EP '287, based on TMP and containing 18 EO units and no PO units. The only embodiment of EP '287 based on glycerin contains *only* EO and the total number of EO units is 24.

The data in Table 2 of the specification show that claimed esters c-e provide an SAP having a very low crosslinker residue (over replicate tests) of from less than 5 to 10 ppm. In contrast, a crosslinker based on TMP and containing 15 EO units (i.e., g) provided an SAP having a 20 to 51 ppm crosslinker residue. A comparative crosslinker based on TMP and containing 3 EO units provided an SAP having 857 to 1302 ppm of residual crosslinkers.

In addition, the claimed esters c-e provided SAPs having a VSI value (saponification index) of 7.5 to 9.5. Comparative TMP-based esters f and g demonstrated a VSI value of 36.9 and 11.6, respectively.

The presently claimed esters therefore show unexpected results with respect to crosslinker residue, which ideally is zero to avoid free monomers in the resulting SAP or the need to perform a method step to remove the crosslinker residue. Unexpected results also are demonstrated with respect to VSI values. As stated in the specification, an ideal crosslinker has a VSI of zero because all crosslinking is performed during the reaction, as opposed to

during a drying step. In turn, the properties of the SAP are not altered by the drying process. See specification, page 50, lines 1-6.

In addition, the test data discussed above shows the unpredictability in the art. In particular, either changing from glycerin to TMP, or excluding PO, or containing more than 5 total EO and PO groups, results in crosslinking agents that vary considerably with respect to residual monomers remaining after a polymerization. It is the presently claimed compounds, i.e., based on the glycerin, containing both EO and PO, and 3 to 5 total EO/PO moieties that provided the unexpected results. These results could not have been predicted from the broad disclosure of EP '287.

In view of the broad disclosure of EP '287, including (a) trimethylolpropane and glycerin-based triacrylates, (b) that the disclosed compounds can be free of either EO or PO units, (c) that the number of disclosed compounds is infinite (i.e., one of  $m \leq 0$  and/or  $n \leq 0$ ), (d) that the examples are primarily directed to TMP-based compounds, and (e) that the only glycerin-based example contains 24 EO units only, *and* the unpredictability in the art, *and* the demonstrated unexpected results, it is submitted that EP '287 cannot render claims 1 and 4-6 obvious under 35 U.S.C. §103.

The present claims are closely tailored to be based on glycerin, contain EO *and* PO units, and contain a total *sum* of EO and PO units of 3, 4, or 5, wherein the esters demonstrate unexpected results with respect to performing as a crosslinking agent for an SAP. EP '287 is directed to homopolymers, and the disclosed esters are not used, or even considered, as crosslinking agents. EP '287 also fails to disclose the presently claimed esters with any specificity, and fails to provide any direction, guidance, or apparent reason for a person skilled in the art of SAPs to select the narrow range of claimed compounds from the infinite number of compounds in the reference (which is directed to a non-aqueous electrolyte secondary battery) with any reasonable expectation of providing a crosslinker for SAPs having unexpectedly improved properties over SAPs crosslinked with other esters also broadly disclosed in EP '287 and closer in structure to the examples of EP '287.

For all of the reasons set forth above, appellants submit that claims 1 and 4-6, in addition to being not anticipated by EP '287, would not have been obvious to a person skilled in the art under 35 U.S.C. §103 over EP '287.

#### **4. Response to Examiner Arguments in Advisory Action**

In the Advisory Action mailed February 2, 2008, the examiner states:

"every point disclosed in the range taught by Matsui et al. is adequate for a 102(b) rejection. Regarding unexpected results, applicants must recognize that the submission of unexpected results is not effective in overcoming a 102 based rejection."

The examiner apparently is ignoring case law and the MPEP with respect to 35 U.S.C. §102(b) rejections. For example, in the *Eli Lilly* case discussed above, the court stated that for a reference to anticipate a claim, the reference must expressly spell out a *definite* and *limited* class of compounds that enable a person skilled in the art to at once envisage each member of this limited class. MPEP §2131.03 II also recites "clearly envisaging" a species from a generic teaching. Also see MPEP §2131.02. Also see *Impax Labs* above. Because '287 discloses infinite class of compounds, with no specific example close in structure to the claimed esters, it is submitted that EP '287 cannot anticipate claims 1 and 4-6.

With respect to appellants discussion of unexpected results and the nonobviousness of claim 1 and 4-6, see the discussion in Section IX.B. above, citing MPEP §2131.03 II, which states that "[T]he unexpected results may also render the claim unobvious." Appellants have taken the extra step to demonstrate the nonobviousness of claims 1 and 4-6.

#### **E. REJECTION OF CLAIMS 7 AND 10 UNDER 35 U.S.C. §102(B) AS BEING ANTICIPATED BY BARTHOLD ET AL. U.S. PATENT NO. 5,472,617 ('617) AND REJECTION OF CLAIMS 11-13 UNDER 35 U.S.C. §103 AS BEING OBVIOUS OVER THE '617 PATENT.**

Independent claim 7, and claims 10-13 depending therefrom, are directed to methods of preparing the (meth)acrylate esters of polyalkoxylated glycerin of claim 1. The 102(b) rejection is based on an assertion that the '617 patent purportedly discloses stripping with a gas which is inert under the reaction conditions. The rejection under §103 is based on

an assertion that claimed process is similar to the '617 process, with minimum variations, and that routine experimentation would lead to the claimed process.

### **1. Disclosure of the '617 Patent**

The '617 patent is directed to a method of demulsifying a crude oil and water mixture using copolymers of (meth)acrylic acid and hydrophilic comonomers. The copolymers are prepared by copolymerizing a (meth)acrylate of an alkoxyated alcohol, diol, or triol with a comonomer, e.g., acrylic acid.

The '617 process of preparing an alkoxyated (meth)acrylic ester is disclosed in the Examples, which the examiner relies upon to support the §102(b) and §103 rejections. See '617 patent, column 8, line 65 through column 11, line 6. In this process, an alkoxyated trimethylolpropane (TMP) is mixed with acrylic acid *under a nitrogen atmosphere* and the reaction is allowed to proceed to yield an acrylic ester of alkoxyated TMP (column 10, line 52 through column 11, line 6). The nitrogen atmosphere is applied prior to and maintained during the reaction. After the reaction is complete, the '617 patent teaches that the mixture is cooled, then reacted with acetic anhydride (column 11, lines 2-5).

The '617 patent also disclose that one equivalent of (meth)acrylic acid is used per equivalent of hydroxyl groups in the alkoxyated alcohol. Specifically, the '617 patent, at column 4, line 63 through column 5, line 1 states:

"The ratio of the oxyalkylated alcohol to acrylic acid or methacrylic acid may be varied from 1:1 to 1:n, where n is the functionality (i.e. the number of hydroxyl groups) of the starting alcohol. A ratio of 1:1 is preferred, since otherwise gelling may be observed during the subsequent polymerization."

The '617 patent therefore discourages, and actually teaches away, from using an excess amount of (meth)acrylic acid in the reaction with the alkoxyated alcohol.

### **2. Rejection of Claims 7 and 10 as Anticipated by the '617 Patent**

Claims 7 and 10 stand rejected under 35 U.S.C. §102(b) as being anticipated by Barthold et al. U.S. Patent No. 5,472,617 ('617). The examiner bases this rejection on a assertion that the '617 patent purportedly discloses stripping with a gas which is inert under the reaction conditions.

It is submitted that differences exist between claims 7, 10, and 16 such that a rejection under 35 U.S.C. §102(b) cannot be sustained. The fact that the '617 patent teaches a nitrogen blanket during polymerization, rather than solvent stripping *after* polymerization, is a substantial difference between claim 7 and the '617 patent disclosure. For example, the presently claimed stripping step i) is performed *after* the reaction between the alkoxyated glycol and the (meth)acrylic acid to form the ester F. See specification, page 22, lines 14-20, disclosing a "solvent stripping operation i)". Also see specification, page 21, line 24 through page 22, line 12, further disclosing the solvent removal steps. In contrast, the '617 patent teaches a nitrogen atmosphere over a reaction between an alkoxyated trimethylolpropane (Example a5) and acrylic acid ('617 patent, column 10, lines 41-55), which alone is a difference that precludes a rejection under 35 U.S.C. §102(b).

One major difference between claims 7 and 10 and the '617 patent is that "stripping" is different from a "nitrogen atmosphere". Attached hereto as Exhibit A from *Hawley's Condensed Chemical Dictionary, Thirteen Ed.* (1997), page 1052, is a definition of "stripping" showing that the term refers to the removal of volatile components from a liquid mixture by the passage of a gas through the liquid mixture. Present stripping step i) removes a solvent from the reaction mixture *after* the polymerization.

Another major difference between the '617 patent and claims 7 and 10 is that the stripping is performed using an "oxygen-containing gas", as presently recited in amended claim 7. The teachings of the '617 patent are limited to nitrogen gas. See specification at page 22, lines 4-7 and 34-36, for example. An oxygen-containing gas is utilized in the stripping step to maintain the inhibitory capabilities of a compound like MEHQ during solvent removal, i.e., to inhibit premature polymerization of the formed ester F. It is well-known in the art that oxygen must be present to maintain this polymerization inhibitory capability. See Exhibit B submitted concurrently with this amendment, an excerpt from "Modern Superabsorbent Polymer Technology" (1998), page 39-44, showing the influence of oxygen on polymerization inhibition.

The '617 patent utilizes a nitrogen blanket to help *remove* oxygen from the reaction system, such that the inhibition capabilities of MEHQ are reduced and the polymerization can proceed. The disclosed "nitrogen blanket" is not a stripping function, but,

as well known in the art, is applied over a reaction mixture in the '617 patent to *preclude* the introduction of oxygen into the reaction system. Accordingly, the "nitrogen blanket" of the '617 patent and the "stripping" stages are not identical (e.g., are performed at different steps of the reaction and perform different functions).

In addition, claim 7 also recites a process for preparing an ester F in the presence of a molar excess of (meth)acrylic acid to alkoxyated glycol of at least 3.15:1. The '617 patent fails to teach or suggest a molar excess of at least 3:15:1 of (meth)acrylic acid in the reaction mixture. In contrast, the '617 patent, at column 4, line 63 through column 5, line 1, quoted above, specifically teaches a 1:1 molar ratio (per hydroxyl group of the alcohol) of oxyalkylated alcohol to (meth)acrylic acid, and that an excess of (meth)acrylic acid *should be avoided* or gelling may occur.

With respect to claim 10, the '617 patent teaches that a 1:1 molar ratio of oxyalkylated alcohol to (meth)acrylic acid should be used. Therefore, the resulting reaction product cannot contain an excess amount (meth)acrylic acid. In addition, a step of removing no more than 75% by weight of excess (meth)acrylic acid is neither taught nor suggested in the '617 patent, and cannot be taught because no excess (meth)acrylic acid is present in the reaction mixture. These are additional reasons why the '617 patent fails to anticipate claim 10 under 35 U.S.C. §102(b).

For all the reasons set forth above, appellants submit that the rejection of claims 7 and 10 under 35 U.S.C. §102(b) should be reversed.

**3. Non-Obviousness of Claims 7 and 10 and Rejection of Claims 11-13 under 35 U.S.C. §103 as Being Obvious over the '617 Patent**

Claims 11-13, which depend from claim 7, also stand rejected under 35 U.S.C. §103 as being obvious over the '617 patent. The examiner relies upon a contention of "routine experimentation" to support the rejection. Although not formally rejected under 35 U.S.C. §103, claims 7 and 10 also would not have been obvious over the '617 patent under 35 U.S.C. §103.

In order to support a rejection under 35 U.S.C. §103, the reference must render the invention obvious *as a whole*. In this regard, claim 7 recites a process for preparing an

ester F in the presence of a molar *excess* of (meth)acrylic acid to alkoxyated glycol of at least 3:15:1. In contrast, the '617 patent specifically teaches that a molar excess of (meth)acrylic acid should be *avoided*. See '617 patent, column 4, line 63 through column 5, line 1 (quoted above). The examiner completely ignored the claimed feature of excess (meth)acrylic acid, and as a result has failed to consider the invention as a whole. Also see claim 10, wherein no more than 75% of the excess (meth)acrylic acid is removed from the reaction mixture, and claim 13, which recites a molar excess of (meth)acrylic acid to alkoxyated glycol of *at least 15:1*. It is readily apparent that the '617 patent not only discourages the use of an excess molar amount of (meth)acrylic acid, but actually teaches away from the claimed invention.

With respect to the claimed feature of stripping with a gas, at column 10, line 52 through column 11, line 2, the '617 patent discloses *reacting* an alkoxyated alcohol with acrylic acid "under a nitrogen blanket". This is not equivalent to the stripping step i) recited in claim 7. The difference between a "nitrogen blanket" of the '617 patent and "stripping" with an oxygen-containing gas is discussed above in Section IX.E.2.

A proper *prima facie* case of obviousness *requires* that the prior art reference teach or suggest *all* of the limitation of the claims. The '617 patent fails to teach a "stripping step" *or* using an "oxygen-containing gas". For these reasons alone, a case of *prima facie* obviousness of claims 7 and 10 in view of the '617 patent cannot be sustained.

Furthermore, a person skilled in the art would not substitute a stripping step with an oxygen containing gas for a nitrogen blanket because a nitrogen blanket removes oxygen to facilitate a reaction, whereas an oxygen-containing gas *retards* a premature reaction, or inhibits the reaction. Thus, there is no apparent or common sense reason for such a substitution. The substitution would not accomplish what the prior art teaches, but would *defeat* the desired result.

As stated above, the '617 patent also fails to teach or suggest a mole excess of at least 3:15:1 of (meth)acrylic acid in the reaction mixture. The '617 patent fails to consider or address using such mole excess of (meth)acrylic acid, and provides no apparent reason for a person skilled in the art to use such a molar excess of (meth)acrylic acid. In contrast, the '617 patent, at column 4, line 63 through column 5, line 1, specifically teaches a 1:1 molar

ratio (per hydroxyl group of the alcohol) of oxyalkylated alcohol to (meth)acrylic acid, and that an excess of (meth)acrylic acid should be avoided.

The '617 patent fails to teach every feature of claims 7 and 10, and, in fact, fails to teach more than one feature of these claims. The '617 patent fails to teach or suggest a solvent stripping step, or using an excess molar amount of (meth)acrylic acid, let alone both claimed features, *and* fails to provide any apparent reason for performing such steps. Claims 7 and 10, therefore, would not have been obvious under 35 U.S.C. §103 over the '617 patent.

The examiner also has failed to articulate clear reasons why the presently claimed invention, as a whole, would have been obvious over the '617 patent. Numerous jumps in reasoning would have been required to arrive at the present invention after reading the '617 patent, one of which is expressly taught as being avoided by the '617 patent. The '617 patent therefore does not provide an incentive or apparent reason for a person skilled in the art to modify the '617 patent in a manner needed to arrive at the presently claimed invention. In summary, process claims 7 and 10 are patentable over the cited '617 patent, and the rejection should be withdrawn.

Claims 11-13, which depend from claim 7, stand rejected under 35 U.S.C. §103 as being obvious over the '617 patent. For the reasons set forth above, it is submitted that claims 11-13 also are patentable over the '617 patent for same of the reasons that claims 7 and 10 are patentable over the cited '617 patent.

The totality of the examiner's reasoning supporting this rejection is found at page 6 of the Office Action stating:

"7. Claims 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barthold et al. (US 5,472,617).

Set forth from paragraph 7 of instant office action, the process of Barthold et al. is very similar to the process of claims 11-13.

The difference between the invention of claims 11-13 and Barthold et al. is that Barthold et al. do not disclose minor variations of the process as claimed.



Nevertheless, Barthold et al. (col. 8, line 65 to col. 9, line 40; col. 9, Table 1; col. 11, Table 3) have clearly disclosed a process for preparing the compound ester F as claimed. Therefore, the examiner believes that it would have been obvious to one of ordinary skill in art to use "routine experimentation" technique to optimize the process of Barthold et al. to obtain the invention of claims 11-13. In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955)."

The examiner has totally failed to articulate reasons why claims 11-13 would have been obvious over the '617 patent, except for a conclusory statement relating to "routine experimentation" and "very similar" processes. As stated above in Section IX.C., the Patent Office *must* make it clear in the record with *facts* and *reasoning* that the teaching-suggestion-motivation to modify the reference exists. Regardless of the rationale supporting a conclusion of obviousness the Patent Office must clearly articulate facts and reasons why the claimed invention "as a whole" would have been obvious to a hypothetical person having ordinary skill in the art at least as of the claimed invention's effective filing date. *See KSR Int'l*, 127 S.Ct. at 1741 (citing with approval *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) ("[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.")); *see also* MPEP §2143 ("The key to supporting any rejection under 35 USC § 103 is the clear articulation of reason(s) why the claimed invention would have been obvious."), and *Ortho-McNeil Pharmaceutical* 86 USPQ at 1201-2 ("a flexible TSM test *remains* the primary guarantee against a non-statutory hindsight analysis (emphasis added).).

In addition, claim 13 recites a molar ratio of (meth)acrylic acid to alkoxylated glycerol in step a) of at least 15:1. The '617 patent absolutely fails to teach, suggest, or even consider such a mole excess of (meth)acrylic acid in the reaction mixture, as stated above. In contrast, the '617 patent, at column 4, line 63 through column 5, line 1 specifically teaches that a molar excess of (meth)acrylic acid *should be* avoided. This alone demonstrates the nonobviousness of claim 13 over the '617 patent, and provides an additional reason why the rejection should be withdrawn.

#### 4. Response to Examiner Arguments in Advisory Action

In the Advisory Action mailed February 2, 2008, the examiner makes several statements in an attempt to support his rejections. These statements either are incorrect and/or strain credulity, even giving pending claims the broadest possible interpretation.

The examiner states the following in the Advisory Action, with reference number added for ease in discussing these various statements:

"(1) Regarding "postcrosslinking", Barthold et al. (col. 7, line 37-50; col. 15, line 41-54) clearly teach a postcrosslinking process. (2) Regarding "drying", Barthold et al. (col. 8, line 55-61; col. 15, line 55-65) clearly disclose a method of rapid removal of water (drying). (3) Regarding applicants' argument that Barthold et al. only teach blanketing with nitrogen, however, applicants fail to recognize that the method disclosed in Barthold et al. still involve passing an inert gas on or over the reactants, which can also function to strip solvents. (4) Regarding the argued "oxygen containing gas", applicants must recognize that the recitation does not specify the location of the oxygen in the gas. Since the polymerization mixture contain methacrylic acid (an oxygen containing compound) that can be stripped or purged by the disclosed nitrogen gas, the examiner has a reasonable basis to believe that the nitrogen gas of Barthold et al. contain an oxygen containing compound (methacrylic acid). (5) Regarding the molar excess of methacrylic acid to alkoxyated glycol of 3.15:1, Barthod [sic] et al. (col 4, line 65) clearly disclose that the methacrylic acid to glycol ranges from 1:1 to 3:1 for n=3. Since Barthold et al. (col. 4, line 67 to col. Col. 5, line 1) clearly indicate that it is not desirable to have gelling occurred, it would not be difficult to one of ordinary skill in the art to recognize and to use an excessive amount of methacrylic acid to prevent the gelling caused by the multifunctional alcohol. Therefore, in view of the reasons set forth above, the rejection of claims 1, 4-7, 10-16, 18, 21, 23, 26, 27, 29, 30, and 32-34 is maintained."

(1) Postcrosslinking process – Addressed in Section IX.F.3., below.

(2) Drying step – Addressed in Section IX.F.3., below.

(3) Nitrogen-blanket – Appellants have clearly differentiated "a blanket" from "stripping" in Section IX.E.3., above. Furthermore, the '617 patent only teaches a nitrogen blanket during the polymerization to keep oxygen out of the reaction mixture. As the examiner states, the '617 patent teaches an "inert gas". The present stripping step is performed *after* the polymerization and utilizes an *active* oxygen-containing gas.

Furthermore, why would a person skilled in the art strip a solvent from a reaction the entire time the reaction is proceeding? The solvent is present to facilitate the reaction and remains until the reaction is complete.

(4) Oxygen-containing gas – The examiner contends that the term "oxygen-containing gas" is met because the "location of the oxygen in the gas" is not recited. He then states that some (meth)acrylic acid may be purged by the nitrogen blanket, and therefore the gas is oxygen containing.

First, appellants have difficulty in understanding what is meant by where the oxygen is located in the gas. The oxygen is located throughout the gas, for example, as in air.

Second, appellants clearly recite an "oxygen-containing gas", i.e., a gas containing O<sub>2</sub>, such as air or an air-nitrogen mixture as set forth in the specification at page 22, lines 34-36. Appellants have defined "oxygen-containing" as meaning containing air, or an O<sub>2</sub> content, and have clearly claimed the gas as such. Using an oxygen-containing *compound*, as suggested by the examiner, is an unreasonable extension of the meaning of the term "oxygen-containing gas". Furthermore, an oxygen-containing compound, e.g., (meth)acrylic acid, would not perform the function desired, i.e., inhibition of premature polymerization. Oxygen (O<sub>2</sub>) performs this function; (meth)acrylic acid will not function as a self inhibitor of polymerization.

Appellants have clearly and definitely recited using a gas containing O<sub>2</sub> in the stripping step.

(5) Molar excess – The '617 patent fails to teach or suggest using an excess amount of (meth)acrylic acid, and discourages such an excess. The '617 patent teaches using 1 mole of acid for a monohydric alcohol, 2 moles of acid for a diol, and 3 moles for a triol ('617 patent, column 4, lines 63-66). The '617 patent then states a "ratio of 1:1 is preferred, since otherwise gelling may be observed during the subsequent polymerization" (column 4, line 67 through column 5, line 1). The '617 patent therefore expressly teaches *avoiding* excess (meth)acrylic acid from a reaction with the alkoxyated alcohol in order to avoid

gelling when the compound is copolymerized with acrylic acid. In *direct contrast*, the present claims recite and require the presence of an excess amount of (meth)acrylic acid.

The examiner totally misreads the '617 patent by stating it using excess (meth)acrylic acid would prevent gelling. The '617 patent expressly states otherwise.

**F. REJECTION OF CLAIMS 14-16, 26, 27, 29, 30, AND 32-34 UNDER 35 U.S.C. §102(b) AS BEING ANTICIPATED BY THE '617 PATENT AND REJECTION OF CLAIMS 26, 27, 29, 30, AND 32-34 UNDER 35 U.S.C. §103 AS BEING OBVIOUS OVER THE '617 PATENT**

Claim 14-16 are directed to a process for preparing a crosslinked hydrogel using a (meth)acrylic ester of polyalkoxylated glycerin of claim 1 (claims 14 and 16) or a compound of structural formula Ia wherein AO can be solely EO or PO (claims 14 and 15). Claims 26, 27, 29, 30, and 32-34 are directed to a crosslinked hydrogel prepared by the method of claim 14 (claims 26, 27, and 32-34) and to articles containing a polymer prepared by the method of claim 14 (claims 29 and 30).

**1. Rejection of Claims 14-16, 26, 27, 29, 30, and 32-34 as Being Anticipated by the '617 Patent**

Each of claims 14, 15 and 16 recite a postcrosslinking step and a drying step. The '617 patent fails to disclose either of these steps, let alone both, and it is imperative that a reference must disclose *each* and *every* claimed feature *in complete* a detail as contained in the claim. See MPEP §2131. Accordingly, differences exist between claims 14-16 and the '617 patent, such that a rejection under 35 U.S.C. §102(b) cannot be maintained.

With respect to claims 26, 27, 29, 30, and 32-34, the '617 patent is silent with respect to the features recited in any of these claims. The '617 patent fails to disclose a crosslinked hydrogel having a saponification index of less than 11 (claim 26), less than 8 (claim 32), or less than 5 (claim 33). The '617 patent also fails to disclose a crosslinked hydrogel having a reduced crosslinker content of less than 10 ppm (claim 27) or less than 5 ppm (claim 34).

It cannot be stated that the hydrogels recited in these claims are inherently anticipated by a polymer of the '617 patent because appellants have demonstrated that the

amount of residual crosslinker and the saponification index change with the identity of the crosslinker. See specification, page 51 and 52, in Tables 1 and 2. The art therefore is unpredictable with respect to the absorption properties of an SAP as they relate to the crosslinking agent used in the preparation of the SAP. To support a contention of inherency, the cited reference must necessarily teach the recited claim element is a necessary feature or result from the disclosure in the reference. The fact that a certain result may occur or be present is insufficient to establish inherency. In addition, the examiner has not provided a basis in fact or technical reasoning to support an assertion that the features of claims 26, 27, 29, 30 and 32-34 necessarily flow from the '617 patent. See MPEP §2112. The '617 patent fails to meet this test, and therefore, cannot anticipate claims 26, 27, 29, 30, and 32-34 based on inherency.

With respect to claim 16, this claim depends from claim 7 and recites additional process steps to prepare a crosslinked hydrogel. Claim 16 therefore is not anticipated under 35 U.S.C. §102(b) for the same reasons that claim 7 is not anticipated by the '617 patent. In addition, the '617 patent fails to teach or suggest *any* of steps k) through n) of claim 16.

The '617 patent teaches a reaction between an alkoxylated alcohol and (meth)acrylic acid to form an oxyalkylated ester monomer ('617 patent, column 10, line 13 through column 11, line 6) and a reaction between the oxyalkylated ester monomer and (meth)acrylic acid ('617 patent, column 11, line 48 through Table 4 of columns 13 and 14). The '617 patent fails to disclose (a) a postcrosslinking step (optional), (b) a drying step (required), or (c) a grinding and/or sieving step (optional). Accordingly, claim 16 recites steps that are not disclosed in the '617 patent, which provides additional reasons why the '617 patent fails to anticipate claim 16 under 35 U.S.C. §102(b).

**2. Rejection of Claims 26, 27, 29, 30, and 32-34 as Being Obvious over the '617 patent.**

Claims 26, 27, 29, 30, and 32-34, which depend from claim 14, stand rejected under 35 U.S.C. §103 as being obvious over the '617 patent. The rationale appears to be that the claims recite a polymer similar to the polymer of the '617 patent, and therefore would have been obvious. Although claims 14-16 do not stand officially rejected under 35 U.S.C.

§103, it is submitted that these claims, like claims 26, 27, 29, 30, and 32-34, would not have been obvious over this reference.

In particular, with respect to claims 14-16, the '617 patent fails to teach a postcrosslinking step or a drying step, and provides no apparent reason for a person skilled in the art to perform such steps. It must be noted that an SAP is postcrosslinked to improve fluid absorption properties. The polymers of the '617 are not SAPs, but oil demulsifiers. The present claims provide a hydrogel designed to absorb and retain large amounts of an aqueous fluid. The polymers of the '617 patent are designed to separate oil from water, not to absorb and retain water. Thus, an improvement of fluid absorption properties is neither considered nor addressed by the '617 patent.

With respect to claims 20, 27, 29, 30, and 32-34, appellants have shown unpredictably in the art in Tables 1 and 2 at pages 51 and 52 of the specification. The data show that absorption properties of a hydrogel are affected by the crosslinking agent. The present polymers are prepared from a polyalkoxylated (meth)acrylate of *glycerol* containing 3, 4, or 5 moles of an alkylene oxide per mole of alcohol. The '617 patent discloses polyalkoxylated (meth)acrylates of an alcohol containing *more* than 5 moles of an alkylene oxide per mole of alcohol. See '617 patent, Table 1, at columns 9 and 10. Therefore, the polyalkoxylated (meth)acrylates of the '617 patent are *different* from the claimed glycerols, and would provide a polymer having absorption properties different from, and inferior to, a claimed hydrogel. See specification, pages 51 and 52.

Such compounds are substantially different from the claimed esters, and polymers crosslinked with a compound similar to those disclosed in the '617 demonstrated inferior absorption properties, as set forth in the examples of the specification. The '617 patent provides no hint or apparent reason to utilize a low mole ratio of alkylene oxide to glycerol, and in fact discourages such a use. The '617 patent is directed to demulsification, i.e., separating oil and water, not to an SAP which is designed to absorb aqueous liquids. The cited reference simply provides no incentive to alter the teachings of the '617 patent, then use a claimed ester to provide a hydrogel, let alone a hydrogel having the absorption properties recited in claims 26, 27, and 32-34.

With respect to article claims 29 and 30, the '617 patent is silent with respect to including a disclosed polymer in any article, but merely teaches use of the polymer as a demulsifier.

In view of the above, appellants submit that claims 14-16, 26, 27, 29, 30, and 32-34 would not have been obvious over the '617 patent.

### **3. Response to Examiner Arguments in Advisory Action**

The examiner's comments in the Advisory Action of February 2, 2008 are set forth above in Section IX.E.4. above. Appellants now address reference numbers (1) and (2) of the examiner's comments.

(1) Postcrosslinking process – The '617 patent at column 7, lines 37-50, teaches that the molecular weight of the polymers can be increased in a subsequent step by additional crosslinking. As taught by the '617 patent, the polymer prepared therein is in *solution* and an additional crosslinking agent is added to react further with the polymer and increase the molecular weight of the polymer. The result is a viscous solution. See '617 patent, column 15, lines 41-45.

The subsequent postcrosslinking of the '617 patent is different from the postcrosslinking recited in the claims. The present postcrosslinking step is disclosed at page 27, line 33 through page 16. A postcrosslinker is added to crosslink only the surfaces of the hydrogel, see specification page 28, lines 2 and 3. The SAP is sprayed to form droplets, a postcrosslinker is applied to the surfaces of the droplets, and the resulting droplets are heated to dry and surface crosslink the SAP *particles*.

It is well known in the art to surface postcrosslink SAP particles as set forth in, "Modern Superabsorbent Polymer Technology," F. Buchholz et al., eds., Wiley-VCH, New York, NY (1998), pages 97-103. It is clear that the term "postcrosslinking", as well-known and used in the art of SAPs, refers to surface crosslinking that improves the absorption properties of the SAP. The additional crosslinking is limited to the surface areas of the SAP particles.

This is substantially different from providing additional crosslinks throughout a polymer in solution to increase the molecular weight of the polymer. If the additional crosslinking step of the '617 patent was performed, the resulting particle would not be a *hydrogel*, as claimed. The excessive amount of crosslinking would not permit the absorption and retention of aqueous fluids required by a hydrogel, e.g., an SAP. The additional crosslinking taught in the '617 patent would therefore destroy the hydrogels of the present invention.

(2) Drying step – The examiner relies upon the '617 patent, column 8, lines 55-61 and column 15, lines 55-65 to support a contention of rapid water removal or drying. The relied upon portions of the '617 patent disclose adding "a demulsifier composition" of the '617 patent (i.e., a polymer) to a crude oil emulsion in order to break the emulsion ('617 patent, column 8, lines 49-54). The crude oil emulsions are "easily separated" into clean oil and brine ('617 patent, column 8, lines 40-48). The '617 patent, at line 15, lines 55-65 demonstrates that the *copolymers* demulsify crude oil, and the amount of water "separated off was recorded".

These portions of the '617 patent again relate to the copolymer of an oxyalkylated monomer and a hydrophilic monomer, and *use* of the *polymer* to demulsifying crude oil. These portions of the '617 patent do not remotely relate to present claim 16, which is directed to a process for preparing a crosslinked hydrogel.

Furthermore, the '617 patent is not remotely directed to the claimed drying step, it is directed to "separating" water from oil in a crude oil emulsion. Present claim 16 recites "drying" the reaction mixture obtained for step k), i.e., removing the remaining water from the polymer by heating the polymers. See specification, page 28, lines 1-16.

Importantly, it must be further noted that the drying step recited in the claims refers to drying of the crosslinked hydrogel. Should the demulsification of the '617 patent somehow be considered as a drying step, it is the *oil* that is being dried in the '617 patent, not the demulsifying polymer. In contrast to the presently claimed drying step, the polymer of the '617 patent is being *hydrated* by its addition to a water-containing crude oil emulsion.



**G. REJECTION OF CLAIMS 18 AND 21-23 UNDER 35 U.S.C. §102(B) AS BEING ANTICIPATED BY THE '617 PATENT**

Claim 18 is directed to a crosslinked hydrogel crosslinked with an ester of claim 1 or a compound of structural formula Ia wherein AO can be solely EO or PO. Claim 21 is directed a composition comprising (a) an ester of claim 1 or a compound of structural formula Ia wherein AO can be solely EO or PO and (b) at least one hydrophilic monomer. Dependent claim 22 recites that the composition of claim 1 further comprises a diluent. Claim 23 recites a hydrogel prepared from the composition of claim 21 and optionally postcrosslinked.

**1. Rejection of Claims 18 and 21-23 as Being Anticipated by the '617 Patent**

With respect to ester F of claims 18 and 21, the '617 patent specifically discloses a ratio of alcohol to alkoxides or from 1:120 to 1:5. See '617 patent at column 3, lines 64 and 65. Claims 18 and 21 recite a sum of  $p_1 + p_2 + p_3$  is 3 or 4. Accordingly, a difference exists between the '617 patent and present claims 18 and 21-23 such that a rejection under 35 U.S.C. §102(b) cannot be maintained.

Furthermore, the '617 patent fails to teach the claimed ester component with sufficient specificity to serve as an anticipating reference for the same reasons claim 1 is patentable over EP '287. See Sections IX.B and D., and incorporated herein. The '617 reference teaches a broad range of esters, but does not allow a person skilled in the art to clearly envision the claimed esters. The '617 patent examples fail to disclose any alkoxylated glycerol, and in each example the total number of moles of alkoxylate is far greater than the claimed number of moles of EO and PO, i.e., 3 or 4.

In view of the above, appellants submit that claims 18 and 21-23 are not anticipated by the '617 patent and that the rejection should be withdrawn.

**2. Nonobviousness of Claims 18 and 21-23**

Although claims 18 and 21-23 were not officially rejected as being obvious over the '617 patent, the above described differences between these claims and the '617 patent are nonobvious differences. The '617 patent generally teaches monofunctional and

multifunctional alcohols at column 3, lines 36-53. Glycerol is disclosed among more than specific 20 alcohols. The '617 patent also discloses 15 alkoxyated alcohols at Table 1 of the reference. No disclosed alkoxyated alcohol in the examples is glycerin, and the ratio of alcohol to alkylene oxide is far above the ratio of 1 to 3 and 1 to 4 recited in claims 18 and 21, e.g., Example a3 of the '617 patent has a ratio of 1 to about 49, Example a4 has a ratio of 1 to about 36. Example a5 has a ratio of 1 to about 66, and Example a6 is 1 to about 40.

The specific teachings of the '617 patent therefore are directed to alkoxyated alcohols containing a high amount of alkylene oxide in order to perform their intended function of demulsifying a crude oil emulsifier. Persons skilled in the art, after reading the '617 patent, would have had no apparent reason to select glycerin from the long list of disclosed alcohols, then alkoxyate with only 3 or 4 ethylene oxide and/or propylene oxide units. Accordingly, it is submitted that claims 18 and 21-23 would not have been obvious to a person of ordinary skill in the art in view of the '617 patent.

With respect to the examiner's contentions regarding the term "diluent" in claim 22, claim 10 of the '617 patent refers to an oil/water mixture to which the *copolymer* is added to *effect* demulsification. The "crude oil and water mixture" is *not* present in the composition prior to polymerization as recited in claim 22, but a polymer is added to the crude oil emulsion after polymerization. See '617 patent, column 8, lines 40-61. Claim 22 further recites that the diluent is water and/or a water-soluble organic solvent, as opposed to crude oil.

With respect to the examiner's comments regarding the '617 patent at column 1, lines 52-62, this portion of the '617 specification is directed to *prior* resins that demonstrates *disadvantages*, such as gelling. The '617 patent disclosure is not directed to the resins disclosed at column 1, lines 52-62, but to resins that may overcome these disadvantages. The '617 patent therefore is directed to resins that do *not* gel, in contrast to the presently claimed SAPs.

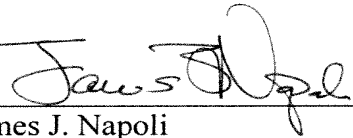
In view of the foregoing, substantial differences exist between the '617 patent and claims 18 and 21-23, and these claims would not have been obvious over the '617 patent under 35 U.S.C. §103.

**X. CONCLUSION**

In view of the foregoing remarks, appellants respectfully request that the Board reverse the final rejection of claims 1, 4-7, 10-16, 18, 21-23, 27, 29, 30, and 32-34, and that all pending claims should be allowed.

Dated: May 15, 2008

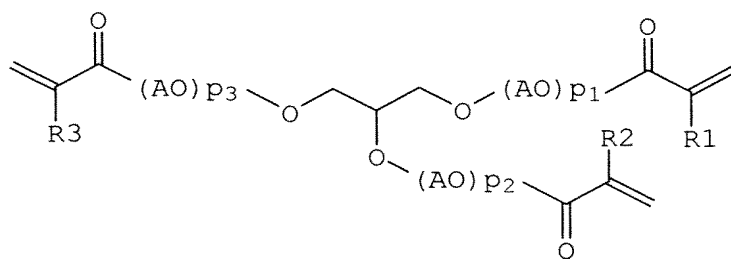
Respectfully submitted,

By   
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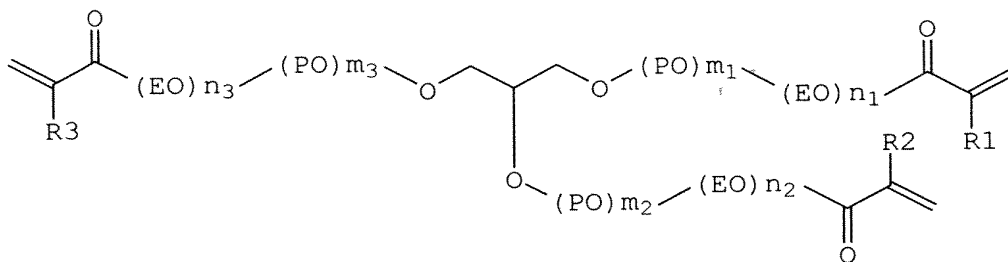
**CLAIMS APPENDIX****Claims on Appeal in Application Serial No. 10/516,702**

1. (Previously presented) An ester F of formula Ia



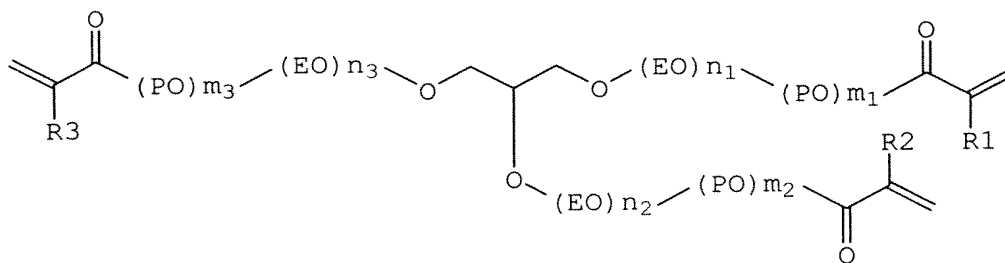
Ia

or formula Ib



Ib

or formula Ic



Ic

wherein AO is for each AO independently EO or PO,

EO is O-CH<sub>2</sub>-CH<sub>2</sub>-,

PO is at each instance independently O-CH<sub>2</sub>-CH(CH<sub>3</sub>)- or O-CH(CH<sub>3</sub>)-CH<sub>2</sub>-

a sum of m<sub>1</sub> + m<sub>2</sub> + m<sub>3</sub> + n<sub>1</sub> + n<sub>2</sub> + n<sub>3</sub> is 3, 4, or 5,

a sum of m<sub>1</sub> + m<sub>2</sub> + m<sub>3</sub> is 1, 2, 3, or 4,

a sum of  $p_1 + p_2 + p_3$  is 3, 4, or 5, and

$R_1$ ,  $R_2$ , and  $R_3$  are independently H or  $\text{CH}_3$ ,

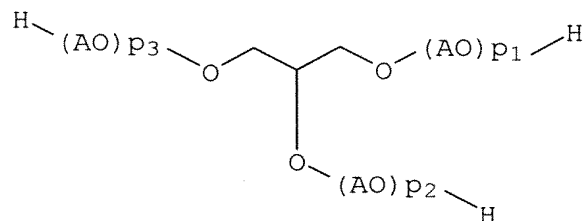
wherein at least one AO is PO and at least one further AO is EO.

4. (Previously presented) The ester F of claim 1 wherein the sum of  $m_1 + m_2 + m_3 + n_1 + n_2 + n_3$  or  $p_1 + p_2 + p_3$  is equal to 3 or 5.

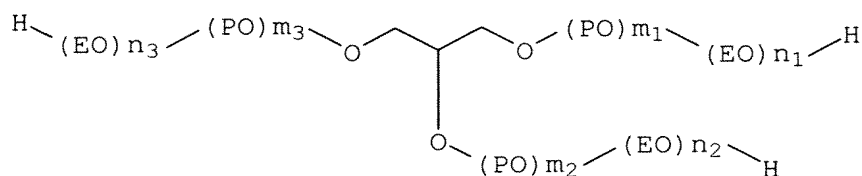
5. (Previously presented) The ester F of claim 1 wherein 3 POs are present in total.

6. (Previously presented) The ester F of claim 1 wherein at least one PO is present in each of the 3 alkoxy chains of glycerol.

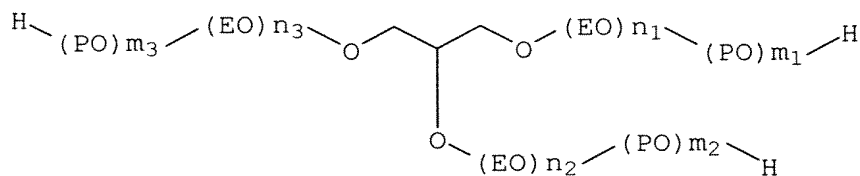
7. (Previously presented) A process for preparing an ester F of claim 1 from an alkoxyated glycerol of the formula IIa, IIb, or IIc



IIa



IIb



IIc

wherein AO, EO, PO, n1, n2, n3, m1, m2, m3, p1, p2, and p3 are each as defined in claim 1,

and (meth)acrylic acid, comprising the steps of

- a) reacting the alkoxyated glycerol with the (meth)acrylic acid in the presence of at least one esterification catalyst C, at least one polymerization inhibitor D, and optionally a water-azeotroping solvent E to form the ester F,
- b) optionally removing from the reaction mixture some or all of the water formed in a), during and/or after a),
- f) optionally neutralizing the reaction mixture,

h) when a solvent E is used, optionally removing the solvent E by distillation, and/or

i) stripping with a an oxygen-containing gas which is inert under the reaction conditions, wherein

a molar excess of (meth)acrylic acid to alkoxylated glycerol is at least 3.15:1

and

the optionally neutralized (meth)acrylic acid present in the reaction mixture after the last process step substantially remains in the reaction mixture.

10. (Previously presented) The process of claim 7 wherein the (meth)acrylic acid is not more than 75% by weight removed from the reaction mixture obtained after the last process step, which reaction mixture contains the ester F.

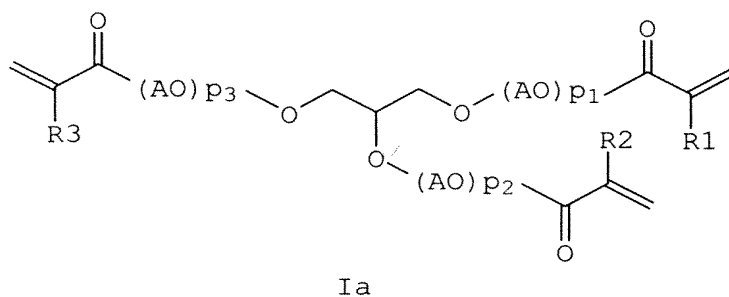
11. (Previously presented) The process of claim 7 wherein the reaction mixture obtained after the last process step, which comprises the ester F, has a DIN EN 3682 acid number of at least 25 mg of KOH/g.

12. (Previously presented) The process of claim 7 wherein the reaction mixture obtained after the last process step, which comprises the ester F, has a (meth)acrylic acid content of at least 0.5% by weight.

13. (Previously presented) The process of claim 7 wherein the molar ratio of (meth)acrylic acid to alkoxylated glycerol in step a) is at least 15:1.

14. (Previously presented) A process for preparing a crosslinked hydrogel, comprising the steps of

- k) polymerizing an ester F of claim 1 or an ester F of the formula Ia



wherein AO is for each AO independently EO or PO,

EO is O-CH<sub>2</sub>-CH<sub>2</sub>-,

PO is at each instance independently O-CH<sub>2</sub>-CH(CH<sub>3</sub>)- or O-CH(CH<sub>3</sub>)-CH<sub>2</sub>-

a sum of p<sub>1</sub> + p<sub>2</sub> + p<sub>3</sub> is 3, 4, or 5,

R<sub>1</sub>, R<sub>2</sub>, and R<sub>3</sub> are independently H or CH<sub>3</sub>,

with (meth)acrylic acid, optionally an additional monoethylenically unsaturated compound N, and optionally one further copolymerizable hydrophilic monomer M, in the presence of at least one free-radical initiator K, and optionally of at least one grafting base L,

- l) postcrosslinking the reaction mixture obtained from k),  
 m) drying the reaction mixture obtained from k) or l), and  
 n) optionally grinding and/or sieving the reaction mixture obtained from k), l), or m).

15. (Previously presented) The process of claim 14 wherein AO is EO.



16. (Previously presented) The process for preparing a crosslinked hydrogel, comprising steps a) to i) of claim 7 and additionally

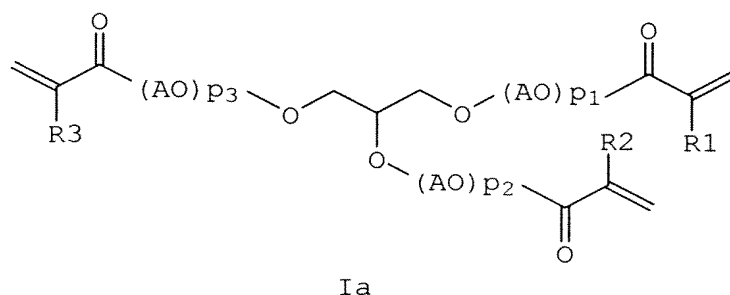
k) polymerizing the reaction mixture from one of stages a) to i) if performed, with an optionally additional monoethylenically unsaturated compound N, and optionally at least one further copolymerizable hydrophilic monomer M, in the presence of at least one free-radical initiator K and optionally at least one grafting base L,

l) optionally postcrosslinking the reaction mixture obtained from k),

m) drying the reaction mixture obtained from k) or l), and

n) optionally grinding and/or sieving the reaction mixture obtained from k), l), or m).

18. (Previously presented) A crosslinked hydrogel comprising at least one hydrophilic monomer M in polymerized form crosslinked with an ester F of claim 1 or an ester F of formula Ia



wherein AO is for each AO independently EO or PO,

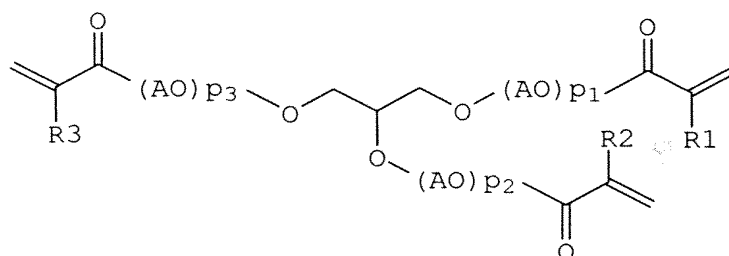
EO is O-CH<sub>2</sub>-CH<sub>2</sub>-,

PO is at each instance independently O-CH<sub>2</sub>-CH(CH<sub>3</sub>)- or O-CH(CH<sub>3</sub>)-CH<sub>2</sub>-

a sum of p<sub>1</sub> + p<sub>2</sub> + p<sub>3</sub> is 3 or 4

R<sub>1</sub>, R<sub>2</sub>, and R<sub>3</sub> are independently H or CH<sub>3</sub>.

21. (Previously presented) A composition comprising from 0.1% to 40% by weight of at least one ester F of claim 1 or an ester F of formula Ia



Ia

wherein AO is for each AO independently EO or PO,  
 EO is O-CH<sub>2</sub>-CH<sub>2</sub>-  
 a sum of p<sub>1</sub> + p<sub>2</sub> + p<sub>3</sub> is 3 or 4,  
 R<sub>1</sub>, R<sub>2</sub>, and R<sub>3</sub> are independently H or CH<sub>3</sub>,  
 and (meth)acrylic acid,  
 0.5-99.9% by weight of at least one hydrophilic monomer M,  
 0-10% by weight of at least one esterification catalyst C,  
 0-5% by weight of at least one polymerization inhibitor D, and  
 0-10% by weight of a solvent E,  
 with the proviso that the sum total is always 100% by weight.

22. (Previously presented) The composition of claim 21 further comprising a diluent G, said diluent selected from the group consisting of water, a mixture of water and one or more organic solvent that is soluble in water in any proportion, and a mixture of water and one or more monohydric and/or polyhydric alcohol.

23. (Previously presented) A crosslinked hydrogel prepared from a composition of claim 21 and optionally postcrosslinked.

26. (Previously presented) A crosslinked hydrogel of claim 14 having a saponification index of less than 11.

27. (Previously presented) A crosslinked hydrogel of claim 14 having a residual crosslinker content of less than 10 ppm.

29. (Previously presented) An article comprising a polymer prepared according to the method of claim 14.
30. (Previously presented) The article of claim 29 selected from the group consisting of a hygiene article, a packaging material, and a nonwoven.
32. (Previously presented) The crosslinked hydrogel of claim 26 having a saponification index of less than 8.
33. (Previously presented) The crosslinked hydrogel of claim 26 having a saponification index of less than 5.
34. (Previously presented) The crosslinked hydrogel of claim 27 having a residual crosslinker content of less than 5 ppm.

**EVIDENCE APPENDIX**

"Hawley's Condensed Chemical Dictionary, Thirteenth Ed." (1997), page 1052. (submitted with Amendment "A" on August 1, 2007)

"Modern Superabsorbent Polymer Technology", F. Buchholz et al., eds., Wiley-VCH, New York, NY (1997), pages 39-44. (submitted with Amendment "A" on August 1, 2007)

**RELATED PROCEEDINGS APPENDIX**

There are no related proceedings.